

With the Author's Compliments

Canadian Agriculture.—Part I.

THE PRAIRIE.

BY

PROFESSOR W. FREAM, B.Sc. LOND., F.L.S., F.G.S.,

COLLEGE OF AGRICULTURE, DOWNTON, SALISBURY.

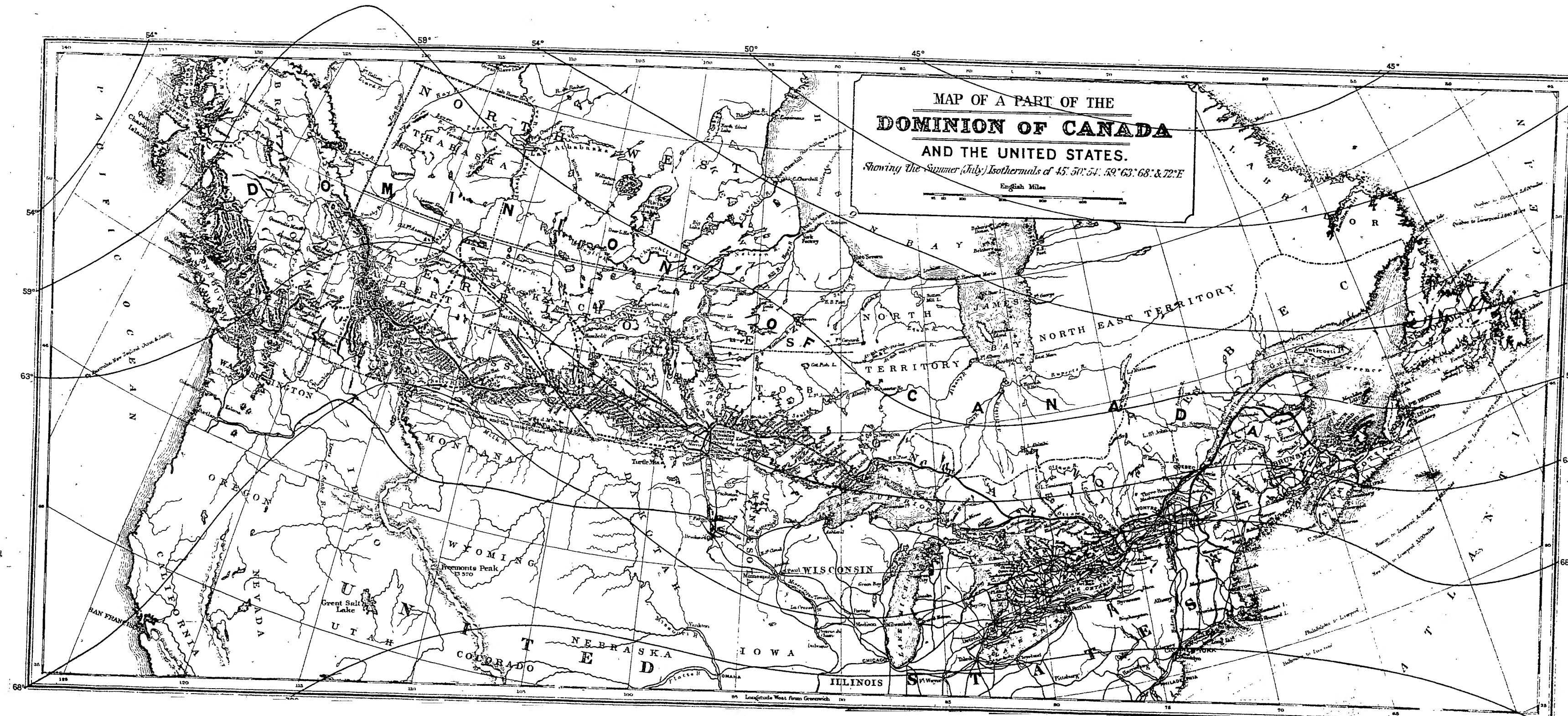
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FROM THE
JOURNAL OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.
VOL. XXI.—SS. PART I.

THE PRAIRIE.

THE Dominion of Canada includes the whole of British North America except Newfoundland. By the British North America Act, passed in 1867, the provinces of Upper and Lower Canada (Ontario and Québec), New Brunswick, and Nova Scotia were united under the title of the "Dominion of Canada," and provision was made in the Act for the admission at any subsequent period of the other provinces and territories of British North America. In 1870, at the close of the Red River Rebellion, the province of Manitoba was formed, and, with the remainder of the vast Hudson's Bay Territory, now called the North-West Territory, was admitted into the Dominion. British Columbia followed in 1871, and Prince Edward Island in 1873. Newfoundland is now the only province not included in the federation.

At the last census, that of 1881, the following figures were obtained :—

PROVINCES.	Area in Square Miles.	Population, 1881.	Increase over 1871.	
			Numerical.	Per cent.
Prince Edward Island	2,133	108,891	14,870	15·8
Nova Scotia	20,907	440,572	52,772	13·6
New Brunswick	27,174	321,233	35,639	12·5
Quebec	188,688	1,359,027	167,511	14·0
Ontario	101,733	1,923,228	302,377	18·6
Manitoba	123,200	63,954	46,959	247·2
British Columbia	341,305	49,459	13,212	36·4
The Territories	2,665,252	56,446	4,446	8·5
Total	3,470,392	4,324,810	637,786	17·3

The square mileage stated is the land area; adding to this the area of the great lakes and rivers, bays and inlets, 140,000—

square miles, there results a total area of over 3,610,000 square miles, which may be compared with the area of Europe, 3,900,000 square miles, and with that of the United States, 2,933,588 square miles, or, including Alaska, 3,510,978 square miles.

Out of the entire population, 403,491 persons, that is, about one-tenth of the total, were owners occupying their own lands. Holders of ten acres or less numbered 75,286. Those who held lands of eleven to 100 acres were 249,997; of from 101 to 200 acres the number of holders was 102,243; and of more than 200 acres, 36,499.

The area of land occupied in the Dominion in 1881 was 45,358,141 acres, of which 21,899,181 acres were improved, 15,112,284 acres being under crop, 6,385,562 acres in pasture, and 401,335 acres in gardens and orchards.

The latest available figures which show the extent of trade in the Dominion are those of the Trade and Navigation Returns for the fiscal year ending June 30th, 1883. The total imports were valued at 26,450,805*l.*, and the total exports at 19,617,160*l.* The aggregate trade, including imports and exports, was apportioned thus: with Great Britain 19,839,536*l.*, and with the United States 19,540,211*l.*, so that, notwithstanding the close proximity of Canada to the United States, the larger portion of her trade is still with the mother country. Upon the total value of imports the Customs revenue amounted to 4,634,462*l.*, being an average duty of 17.52 per cent., and an average of 22*s.* per head of the population. The exports of the produce of Canada, shipped at Canadian ports, were:—

	£
Produce of the mine	594,177
" fisheries	1,761,824
" forest	5,074,145
Animals and their produce.	4,056,869
Agricultural products	4,563,704
Manufactures	700,644

The chief items under "animals and their produce" were:—

	£
Horses	326,658
Horned cattle	779,605
Sheep	277,611
Swine and their produce	117,794
Butter	341,163
Cheese	1,290,374
Furs	217,505
Hides	92,197
Bacon	87,395
Wool	56,106
Eggs	451,317

The chief items included under "agricultural products" were:—

	£
Barley	1,258,647
Wheat	1,176,298
Flour	503,191
Hay	180,421
Malt	227,340
Potatoes	209,791
Peas	432,342

In addition to the above, wheat, in transit from the Western United States, was exported to the value of 1,164,377.

As Canada is a young country, with a sparse population widely scattered, her revenue is derived from indirect taxation, there being at present many obstacles in the way of the collection of direct taxes. The inland revenue in the fiscal year ending June 30th, 1883, amounted to 1,375,652*l.*, of which 780,573*l.* was raised from spirits, 81,005*l.* from malt, and 377,260*l.* from tobacco. Of the last-named article, 9,558,952 lb. were manufactured, of which 454,922 lb. were exported. For reasons already stated, and on account of the proximity of the United States, where Protection prevails, a protective tariff is imposed on all, or nearly all, imports into the Dominion; and it is claimed that owing to this "national policy," formulated in 1878, the manufacturing industries of Canada have been very greatly developed. Mr. Patterson, Secretary of the Montreal Board of Trade, in one of his reports, said that "in 1881 the total foreign trade of Canada was larger, in proportion to the population, than that of the United States; while the shipping of Canada, per head of the population, was more than four times as large."

The imports of wheat and bread stuffs from Canada into the United Kingdom during the last ten years, are set forth in the following table:—

	Wheat.	Wheat-meal and Flour.
	Cwts.	Cwts.
1874	3,807,174	389,355
1875	3,604,610	358,766
1876	2,417,151	282,053
1877	2,912,178	254,695
1878	2,603,586	294,448
1879	4,676,686	460,435
1880	3,893,544	521,702
1881	2,860,854	260,342
1882	2,684,828	339,305
1883	1,798,056	469,460

A country that spans the globe from the Atlantic to the

Pacific, whose southernmost point extends as far down as the latitude of Rome, while its northern limits are lost amid the ice-fields of the Arctic seas, and whose area is nearly equal to that of Europe, must necessarily possess many and striking variations in its physical features. And yet, in a few words, it may be said that the eastern part of the Dominion—the provinces of Nova Scotia, New Brunswick, Quebec, and Ontario—is forest; the western portion, British Columbia, is mountain; while the intermediate area of vast plains with their woodland borders constitutes the prairie region of Manitoba and the North-West Territories.

"To characterise in a few lines a country covering more than half the continent of North America, and reaching from the latitude of Constantinople to the North Pole—a country whose circuitous coast-line on the Atlantic measures 10,000 miles, and whose western shore upon the Pacific, studded with islands and indented by secure harbours and deep inlets, attains almost an equal length—a country where maize and peaches are staple crops, and where vegetation fades out upon the desolate and melancholy shores of the Arctic Ocean,—to characterise such a country by a few general phrases is evidently impossible. If we look at the eastern portion alone, we see the greatest forest region in the world. If we consider the central portion, we are regarding the great prairie country; but if we cross the passes into the Pacific Province, we enter upon that 'Sea of Mountains,' compared with which the most mountainous country in Europe is of limited extent.

"And yet, there are aspects in which, when British Columbia is excepted, this great country may be apprehended by a wide generalisation. It is a country of broad lakes and flowing waters. A country where the abundance of streams and the regularity of summer rains preclude the possibility of drought. It is a land of grass and forest. A country containing by far the largest portion of fresh water upon the globe; where, 2000 miles from the ocean, the traveller may lose sight of land and be prostrated by sea-sickness. A land containing the most extensive water-ways in the world; where thousands of miles of navigable rivers may conduct commerce into the remotest corner of the continent at its widest part. The slope of the land from the Rocky Mountains is so gradual that the rivers flow with an even stream, and their sources are so certain that they flow with an equable volume. The only abrupt fall of land from Edmonton to the sea is the terrace at Niagara. That fall, and the minor rapids of the St. Lawrence, are overcome by the most complete system of canals in the world, and, with one transshipment at Montreal, goods can be landed at the head of Lake Superior in the centre of the continent, 2384 miles from the Straits of Belleisle. Of this distance, 1500 miles are in fresh water; but if we turn farther north, and enter Canada by Hudson's Bay, the ocean ship will reach, at Port Nelson, the outlet of a river system stretching out with few interruptions to the very backbone of the continent; and draining an interior basin, remoter than the St. Lawrence basin, of over 2,000,000 square miles in extent. This profound penetration and permeation of the country by water-ways is the great characteristic of Canada. From Port Nelson to Liverpool is 2941 miles—from New York to Liverpool is 3040 miles. It is difficult to realise the fact that there, in the very centre of America, an Englishman is 99 miles nearer home than at New York."*

* 'Handbook for the Dominion of Canada.' Dawson Bros., Montreal, 1884, p. 4.

In writing on such a subject as the agriculture of Canada, it is hardly possible to at once plunge into technical details, without entering at some little length into the natural features of the different sections of the Dominion. In discussing the farming of, for example, an English county, it would be safe to assume on the part of the reader a general knowledge of facts which, in the case of the vast area of Greater Britain now under consideration, it would perhaps be hardly fair to take for granted. The Marquis of Lorne, in a beautifully illustrated work recently published, which should be read by every one who is interested in the Dominion, speaks of "the general ignorance of Canada in England," and remarks aptly enough * :—

"Although Canada is now only eight days from our shores, and Australia can be reached in the time which a sailing vessel formerly took to reach America, yet there is still a vast amount of misconception of the position and prospects of our dependencies. It is, perhaps, a misfortune that men often begin to acquire a useful knowledge about the colonies when it is too late for them to make use of it for their own good. The information as regards the prospects of life in these great territories should be given in the schools and universities. To many a boy an accurate knowledge of how money can best be made, and the early years of manhood most profitably spent in Australia, New Zealand, and the Dominion of Canada, would be of far more use than much of the obsolete erudition still retailed to him in our English public schools. The voyages of Cook, of Champlain, and Vancouver are as interesting as are those of Ulysses, and the subsequent history of the lands they discovered the most edifying for an English boy. If true information were readily obtained, and colonial life were brought as familiarly to the minds of Englishmen as their own home life, it is difficult to believe that there would remain so many here who have no occupation but the proverbial privilege of grumbling at their own fate, and at all around them. In Canada, if it were not for the constant bright sunshine, and for certain improvements in the art of Government, both central and local, the Scotch and English emigrants might imagine that they had never left the Old World, so good are the schools, so orderly are the people, so easy the communication from one district to another."

During the last two or three years, that portion of Canada known as the Prairie has attracted far more attention in England than has lately been bestowed upon the older and better-known provinces of the Dominion. It has been deemed advisable, therefore, to devote the first part of this paper to a discussion of the natural and agricultural features of Manitoba and the North-West. As the agricultural development of a country must be largely influenced by the character of its surface, the constitution and capabilities of its soils, the composition and value of its native herbage, and, above all, by its climate, a notice of these and allied subjects will naturally prepare the way for the

* 'Canadian Pictures drawn with Pen and Pencil.' By the Marquis of Lorne, K.T. London, the Religious Tract Society, 1884, p. 21.

subsequent description of prairie farming. The latter part of the paper deals with the agriculture of the longer settled and better known provinces of Eastern Canada.

THE PRAIRIE.

Physical Features.—The surface of the prairie region of British North America occupies three extensive steppes, or table-lands, the lowest of which is on the east, and the most elevated on the west. The political boundary between Canada and the Western United States is here identical with the 49th parallel of north latitude, and along this line the prairie extends from the 96th to the 112th meridian, a distance of about 900 miles from east to west. Northwards the prairie becomes narrower, and where it disappears on the bleak coasts of the Arctic Ocean its width does not exceed 400 miles. The Canadian prairie is bounded on the east by the rocky plateau which fringes the western shores of Lake Winnipeg, and then strikes west and north-west to Lake Athabasca. This plateau consists of very ancient crystalline rocks, of Laurentian and perhaps Huronian age, and does not present an unbroken front to the prairie, for it is penetrated by the Nelson and Churchill rivers on their way to Hudson's Bay. The character of this plateau may be well observed in travelling along the Canadian Pacific Railway from Port Arthur, Lake Superior, to the city of Winnipeg, a distance of 429 miles, nearly 340 of which are across this boundary; much of the scenery is wild and rocky, and suggestive of mineral wealth, while in some parts dense woods and undergrowth, and in others extensive swamps, meet the eye. This wide belt of country presents few or no features of agricultural interest, and, indeed, whatever agricultural development it is capable of is likely to be long deferred, while such vast areas of fertile treeless prairie remain to the west. In the neighbourhood of Telford, 338 miles west of Port Arthur, and 91 miles east of Winnipeg, the rocky plateau, with its poplars, tamaracs, and other trees, gives place to a level sweeping country with stunted shrubs, and the clear rapid streams of the rocks are replaced by sluggish, muddy rivulets. The land of rock and swamp and timber is left behind, and the rich alluvial soil of the eastern fringe of the prairies is entered upon, for this is the Red River valley, with its eastern belt of muskeg, or floating swamp, 20 miles wide.

The western boundary of the prairie region is constituted by the magnificent natural rampart of the Rocky Mountains, the junction of plateau and mountain being usually flanked by foothills, such as those to the south and west of Calgary, among which

the Canadian cattle ranches have been established. This superb mountain axis consists really of a series of parallel ranges, their total breadth from east to west extending some hundreds of miles, and the loftier peaks being clad with perpetual snow thrown into bold relief when contrasted with the dark green hues of the pine trees which clothe the lower slopes. Professor Ramsay, of Glasgow University, writes :—

“There are few grander sights than the circle of the Alps as seen from the Milan Cathedral, scarcely less fine is the vast wall of the Pyrenees as sighted from Toulouse, but neither the one nor the other presents so magnificent a spectacle as that steep, straight line of snowy peaks, rising in one endless chain out of the flat to put bounds at length to the seemingly boundless prairie.”

The Rockies constitute the water-parting* which separates the rivers that take their origin on the eastern water-shed from those which are fed by the drainage of the Pacific slopes.

Almost coincident with the political boundary on the south of the Canadian prairie there stretches in a sinuous course from east to west a line of water-parting which separates the river basins of the Mississippi-Missouri system on the south, from those of the Saskatchewan, the Assiniboine, and the Red Rivers on the north, whose waters, passing through Lake Winnipeg, are ultimately discharged into Hudson's Bay. East of the Red River this water-parting attains an elevation of some 1400 feet; farther west, in the State of Dakota, it rises to 2000 feet; and as the mountains are approached it reaches a height of about 4000 feet above the sea-level.

Considerably to the north, in the region of the 54th parallel, another water-parting, trending generally east and west, separates the drainage areas of those rivers, such as the Athabasca and Peace Rivers, which flow directly into the Arctic Ocean, from those of the great Saskatchewan system; but this line of water-parting attains a less lofty elevation than the more southern one.

Roughly speaking, the Canadian portion of the three steppes or plateaux forming the prairie region, may be regarded as enclosed or embraced by the four natural boundaries whose position I have endeavoured to indicate,—the old Laurentian plateau on the east and north-east, the Rocky Mountains on the west, and the two lines of water-parting lying respectively north and south. Although, as has been stated, the vast plains extend to the shores of the Arctic Ocean, yet north of the North Saskatchewan River the essential prairie features are not

* “To avoid all ambiguity it is perhaps best to set aside the original meaning of ‘watershed,’ and employ the term to denote the slope along which the water flows, while the expression ‘water-parting’ is employed for the summit of this slope.”—Huxley, ‘Physiography,’ p. 18.

retained, most of this northern area being covered with dense forests of evergreen trees.

The whole of the prairie region has a gradual but gentle slope from west to east, amounting for the entire area to about 5 feet per mile. Along two lines, however, which are more or less parallel, and which trend in a north-west and south-east direction, a rise decidedly marked, but not abrupt, is encountered in proceeding from east to west; these are the escarpments which form the boundaries of the second and third prairie steppes. The lowest and most eastern prairie-level is that which comprises the Red River valley, and Lake Winnipeg with its adjacent lands on the west. The average altitude of this plain is about 800 feet, the surface of Lake Superior being 627 feet above the sea; its average breadth exceeds 100 miles, and its area is about 56,000 square miles, of which one-fourth is water. This level is bounded on the east by the Laurentian plateau, and on the west by the first escarpment, which is ascended in the neighbourhood of Macgregor, 80 miles west of Winnipeg. This escarpment trends north-west, through the "mountains" lying to the west of Lake Winnipegosis.

When the summit of the first escarpment is reached, in the neighbourhood of Macgregor, a vast open country, called the Great Plains, and forming the second prairie steppe, is entered upon. On the 49th parallel of latitude this second steppe is 230 miles wide, while farther north, on the 54th parallel, its width is not more than 200 miles. Its average elevation is about 1600 feet, and it is bounded westward by the remarkable physical feature known as the Grand Coteau of the Missouri (Fr. *côteau*, a hill-slope), which is chiefly a great mass of glacial detritus and ice-travelled blocks, resting upon a sloping surface of rocks of Cretaceous age, and extending diagonally across the central region of North America, from south-east to north-west for a distance of about 800 miles. On the 49th parallel the Coteau is 30 miles wide, and it broadens out somewhat as it is traced northward. As the Coteau is ascended from its eastern base, the surface is seen to become gradually more undulating, and in its upper parts the drift materials are confusedly accumulated into low hills, which, however, seldom attain a greater height than 100 feet above the level of the Coteau, the average elevation of which, at the 49th parallel, is 2000 feet. The Coteau belt is practically destitute of drainage valleys, hence the waters of its pools and lakes are charged with salts, particularly magnesium and sodium sulphates. The western part of the Coteau contains wide deep valleys, with tributary *coulées*, which are mostly dry, or else occupied by chains of small lakes, which dry up in summer, and thus leave large white

patches of efflorescent salts, which present a marked contrast with the crimson tufts of the marsh samphire, *Salicornia*, fringing the border. Besides the smaller sheets of water, there are much larger saline lakes, such as the Old Wives' Lakes, which are persistent. The Missouri Coteau is about 400 miles west of Winnipeg, and fringes the eastern margin of the third and highest prairie steppe, which extends, with a gentle ascent westward, to the base of the Rocky Mountains.

The lowest and most eastern prairie steppe is largely identical with, though broader than, the Red River valley. The floor of this valley is entirely of alluvial origin, and consists chiefly of the sediments of a great lake of post-glacial age, comprising exceedingly fine silt, covered by black vegetable mould. The valley is about 40 miles wide, and extends along either side of the river from north to south of the province of Manitoba. Its surface is perfectly flat and undiversified, "the most absolutely level prairie region of America."

From the western boundary of the Red River valley to the foot of the Rocky Mountains, the distance across the second and third prairie steppes is about 700 miles. The surface of the second prairie steppe is less even than that of the Red River valley, and is covered with thick deposits of drift, consisting chiefly of detritus worn from the soft underlying rocks, but mingled with other mineral rubbish transported from a distance. From the prairie level there arise in certain localities low hills, such as Turtle Mountain and the Touchwood Hills, composed of accumulations of drift materials similar to those of the Missouri Coteau. Turtle Mountain nowhere attains a height of more than 500 feet above the prairie. It is a region of broken hilly ground about 20 miles square, is thickly wooded, and hence presents a marked contrast to the general features of the prairie. As a rule, the hilly regions composed of gravel are wooded; whereas the finer material of the plains has a grass-covered surface, except in some places along the sides of streams where timber also grows.

The third steppe, lying west of the Coteau, has a much thinner covering of drift deposits, a good deal of which consists of fragments of quartzite from the Rocky Mountains. Its eastern part presents in places thick deposits of true till or boulder clay. Its surface is more worn and diversified than is the case with the first and second steppes, and, as the Rockies are approached, it is found to consist of fragments of quartzite with softer shaly and slaty rocks and limestone. In various localities boulders are numerous, and some of these have been used in modern times by the buffalo as rubbing-stones, and are surrounded by basin-shaped depressions formed by the feet of these animals:—

"The buffalo is now extinct on these plains; but abundant traces of its former presence exist in the rubbing-stones, wallows, deeply-worn paths, and bleached skeletons, and at one place on the Bow River we saw a large deposit of bones covered with earth washed down from above, and apparently indicative of the destruction of a herd from some natural cause, perhaps unusual cold and heavy snow. The latter, when followed by thaw and frost, producing a hard icy crust, has sometimes proved destructive to cattle on the higher plains."*

The third steppe, which has a width of 450 miles on the 49th parallel, narrows rapidly as it is traced northwards.

"The geology of our great North-West, like our vast plains and immense rivers, is on a magnificent scale. To the eye of the geologist a grand vision appears as he contemplates the marvellous panorama that rolls before him, portraying the geological features of the country lying between the Laurentian rocks to our east, and the lofty mountains of the west. The former, representatives of the first rocks to triumph over the universal waters of primeval days, and the latter belonging to a period near the summit of the geological series. Between these great natural boundaries we see stretching before us the three vast prairie-steppes of the North-West, rising in succession above each other and distinguished by characteristic physical features."†

Underlying nearly the whole of the prairie region are clays, sandstones, and limestones of Cretaceous age, or (in the more western parts) shales and sandstones of the Laramie‡ or Lignitic Tertiary group, the age of the latter being probably intermediate between that of the Cretaceous and of the Eocene of England. The nearest parallel to be found at home is afforded by the greater part of the counties of Norfolk and Suffolk, where Cretaceous rocks (chalk in this case) are overlaid by glacial detritus or drift. The alluvium of the Red River valley rests upon strata of Silurian age.

Though the prairie soils are largely either of glacial or of alluvial origin, they are not the product exclusively of such agencies:—

"Long continued growth and decay of vegetation upon a land surface not only promotes disintegration of the superficial rock, but produces an organic residue, the intermingling of which with mineral débris constitutes vegetable soil. Undisturbed through long ages, this process has, under favourable conditions, given rise to accumulations of a rich dark loam. Such are the 'regur,' or rich black cotton soil of India, the 'tchernayzem,' or black earth, of Russia, containing from 6 to 10 per cent. of organic matter, and the deep fertile soil of the American prairies and savannahs. These formations cover plains many thousands of square miles in extent."§

Nor must the effects of animal life be overlooked:—

"Burrowing animals, by throwing up the soil and subsoil, expose these to

* 'Observations on the Geology of the Line of the Canadian Pacific Railway.' By Sir J. W. Dawson, F.R.S. 'Quart. Jour. Geol. Soc.' 1884, p. 387.

† 'Geology of the Red River Valley.' By J. Hoyer Pantou, M.A.

‡ A term derived from Laramie City, in the State of Wyoming, lat. 42°.

§ 'Text-book of Geology.' By Archibald Geikie, F.R.S., p. 458.

be dried and blown away by the wind. At the same time their subterranean passages serve to drain off the superficial water and to injure the stability of the surface of the ground above them. In Britain the mole and rabbit are familiar examples. In North America the prairie dog and gopher have undermined extensive tracts of pasture land in the west.*

These last are little animals allied to the squirrel, the so-called prairie dog being a rodent, and not a carnivore. I saw numbers of them scampering along the ground beside the track of the Canadian Pacific Railway. Their open burrows are inconvenient to horses travelling across the prairie, and sometimes the animals become a nuisance by devouring newly sown seed; on the Bell Farm a halfpenny each is given for their tails.

The beaver, again, though receding at the approach of man, has left unmistakable signs of his former presence:—

"The flow of streams is sometimes interfered with, or even diverted, by the operations of animals. Thus the beaver, by cutting down trees (sometimes one foot or more in diameter) and constructing dams with the stems and branches, checks the flow of water-courses, intercepts floating materials, and sometimes even diverts the water into new channels. This action is typically displayed in Canada and in the Rocky Mountain regions of the United States. Thousands of acres in many valleys have been converted into lakes, which, intercepting the sediment carried down by the streams, and being likewise invaded by marshy vegetation, have subsequently become morass and finally meadow-land. The extent to which, in these regions, the alluvial formations of valleys have been modified and extended by the operations of the beaver is almost incredible."†

The conservative action of animals upon the earth's surface is less marked, but the following case deserves mention:—

"In the prairie regions of Wyoming and other tracts of North America, some interesting minor effects are referable to the herds of roving animals which migrate over these territories. The trails made by the bison, the elk, and the big-horn or mountain sheep, are firmly trodden tracks on which vegetation will not grow for many years. All over the region traversed by the bison, numerous circular patches of grass are to be seen which have been formed on the hollows where this animal has wallowed. Originally they are shallow depressions formed in great numbers where a herd of bisons has rested for a time. On the advent of the rains they become pools of water; thereafter grasses spring up luxuriantly, and so bind the soil together that these grassy patches, or 'bison-wallows,' may actually become slightly raised above the general level if the surrounding country becomes parched and degraded by winds."‡

On the level prairies the buffalo trails may be seen, stretching away in dark and well-defined straight lines, till the eye fails to distinguish them in the distance.

* 'Text-book of Geology,' p. 455.

† *Ibid.*

‡ *Ibid.*; and Comstock in Captain Jones's 'Reconnaissance of N.W. Wyoming, 1875, p. 175

It is worthy of note that the earthworm, the most useful of all animals in the soil, appears to be absent from the prairie, or is at least very uncommon. Professor Macoun informs me that he has never seen one on the prairie, nor has he ever heard of one being seen by the Dominion land surveyors. Of course, this is only negative evidence, but if the lowly annelid be not already a dweller in the prairie soil, it is difficult to imagine why it should not become so, save perhaps in the alkali lands and "bad lands." This absence is, however, probably apparent rather than real, for Darwin states* that "earthworms are found in all parts of the world," although he does not refer specifically to the American prairies.

Soils.—The remarkable richness of much of the prairie soil of Manitoba arises from the accumulation for ages past of the excreta of animals, the ashes of prairie fires, and the decaying remains of plants and animals, in a loamy matrix resting upon a retentive clay subsoil. In 1882, between forty and fifty samples of soil, taken at intervals between Winnipeg and the Rocky Mountains, were exhibited at the Royal Agricultural Society's Show at Reading; they were shown in glass tubes, four feet in length, each tube containing a core of the soil and subsoil from the surface downward. Three samples of the surface soils were submitted to Sir J. B. Lawes, F.R.S., and Dr. J. H. Gilbert, F.R.S., for the determination of the nitrogen. No. 1 was from Portage la Prairie, 56 miles west of Winnipeg, and had probably been under cultivation for several years; the dry mould contained 0.2471 per cent. of nitrogen. No. 2, from the Saskatchewan District, about 140 miles from Winnipeg, had probably been under cultivation a shorter time than No. 1; its dry mould contained 0.3027 per cent. of nitrogen. No. 3, from a spot about 40 miles from Fort Ellice, might be considered a virgin soil; the dry mould contained 0.2500 per cent. of nitrogen. In general terms, these soils are about twice as rich in nitrogen as the average of the Rothamsted arable surface soils; and, so far as can be judged, are probably about twice as rich as the average of arable soils in Great Britain. They correspond in their amount of nitrogen very closely with the surface soils of our permanent pasture land. At the recent meeting of the British Association at Montreal, Sir J. B. Lawes and Dr. Gilbert presented to the Chemical Section a paper "On some points in the composition of soils, with results illustrating the sources of the fertility of Manitoba prairie soils," and I am indebted to Dr. Gilbert for his kindness in revising a Canadian newspaper report, from which I proceed

* "The Formation of Vegetable Mould through the Action of Worms," p. 120.

to make a few extracts. Besides the three soils already referred to, four other Manitoba soils were examined in greater detail. They came respectively from Niverville, 44 miles west of Winnipeg; from Brandon, 133 miles west of Winnipeg; from Selkirk, 22 miles north-east of Winnipeg; and from Winnipeg itself. These soils showed a very high percentage of nitrogen; that from Niverville nearly twice as high a percentage as in the first 6 or 9 inches of ordinary arable land, and about as high as the surface soil of pasture land in Great Britain. That from Brandon was less rich, still the first 12 inches of depth is as rich as the first 6 or 9 inches of good old arable lands. The soil from Selkirk showed an extremely high percentage of nitrogen in the first 12 inches, and in the second 12 inches as high a percentage as in ordinary pasture surface soil. Lastly, both the first and second 12 inches of the Winnipeg soil were shown to be very rich in nitrogen, richer than the average of old pasture surface soil. To determine to what extent the nitrogen in these soils is susceptible of nitrification, and so of becoming available for plant-growth, the soils and subsoils were placed in shallow dishes, covered with plates of glass, kept under proper conditions of temperature and moisture for specified periods, extracted from time to time, and the nitric acid determined in the extracts. The periods were never less than twenty-eight days, and the rate of nitrification declined after the third and fourth periods. In the case of the subsoils, there was a very marked increase in the rate of nitrification during the eighth period as compared with the seventh, there having been only a tenth of a gram of garden soil containing nitrifying organisms added. This result is very striking, and of much interest, affording evidence that the nitrogen of subsoils is subject to nitrification if only in suitable conditions, and the result lends confirmation to the view that deep-rooted plants may favour nitrification in the lower layers of the soil.

The authors further state that official records show that the rich prairie soils of the North-West are competent to yield large crops, but under present conditions they do not give yields commensurate with their richness, compared with the soils of Great Britain, which have been under arable cultivation for centuries. That the rich prairie soils do not yield more produce is due partly to climate, but largely to scarcity of labour, and consequent imperfect cultivation, thus leading to too luxuriant a growth of weeds; and until mixed agriculture and stock-feeding can be had recourse to, and local demand arises, the burning of the straw, and deficiency and waste of manure, are more or less inevitable, but still exhausting practices. So long as land is cheap and labour dear, some sacrifice of

fertility is unavoidable in the process of bringing these virgin soils under profitable cultivation, and the only remedy is to be found in increase of population. Still the fact should not be lost sight of, that such practices of pioneer settlement do involve serious waste of fertility. It may not be out of place to append the opinion of the Rothamsted investigators, that a fertile soil is one which has accumulated within it the residue of ages of previous vegetation, and that it becomes infertile as this residue is exhausted.

Through the kindness of my colleague, Dr. J. M. H. Munro, F.C.S., I am able to give the following complete analysis of, and report upon, a sample of prairie soil taken from the first 12 inches :—

Analysis of Prairie Soil from Birtle, Manitoba.

The soil dried at 212° F. contains—

Organic matter and combined water	.. ..	9.70
Small stones and gravel	.. ..	1.41
Gravelly sand	.. ..	2.45
Coarse sand	.. ..	64.20
Fine sand	.. ..	11.70
Clay and clayey sand (ignited)	10.54
		<hr/> 100.00

Associated in the air-dried soil with—

Moisture	6.70
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The fine earth (passing through a sieve 30 meshes to the inch) dried at 212° F. contains—

Organic matter and combined water	.. ..	10.07
Sand and silicates	.. ..	83.41
Peroxide of iron and alumina	.. ..	4.195
Carbonate of lime	.. ..	0.96
Potash (K_2O)	.. ..	0.271
Phosphoric acid (P_2O_5)	.. ..	0.195
Magnesia (MgO)	.. ..	0.487
Chlorine	.. ..	0.010
Sulphuric acid (SO_3)	.. ..	trace
Not determined, and loss	.. ..	0.402
		<hr/> 100.000

Total nitrogen	.. ..	Per cent.
Total minerals dissolved by cold water	.. ..	0.412
Potash soluble in water	.. ..	0.048
		0.0081

The sand and gravel of the soil consist chiefly of fragments and pebbles of quartz, with an admixture of other minerals derived from igneous rocks, and here and there a spangle of mica. The black colour is due to vegetable matter, which is present in very large proportion, and is the chief source of the great fertility of the soil. A rough measure of this fertility is the percentage

of nitrogen in the fine earth, which is at least double that found in the surface soil of good English pasture. There is an ample proportion of phosphoric acid, and the supply of potash is very large, as is usually the case with soils formed of the debris of volcanic rocks. Lime alone, of all the elements of fertility, is present in feeble proportion, and its application to this and similar soils will probably be of great benefit in the near future, before the need arises for the use of the ordinary artificial manures. The high relative proportion of magnesia is noteworthy in connection with the wheat-growing properties of the soil.

Native Herbage.—The most essential feature of the prairie is, perhaps, its treeless character, this characteristic being, in fact, indicated in the name (Fr. *prairie*, a meadow). Thus the great mass of the vegetation of the prairie is composed of herbage, though shrubs may sometimes be seen in swampy localities, and the course of a river or stream is often indicated by a line of low trees. The character and feeding quality of the prairie herbage are matters of prime importance from an agricultural point of view, and it is well to recall the fact that for ages the prairie has been the grazing ground of vast herds of buffalo, whose descendants are now fast disappearing. This fact alone is highly suggestive of the nutrient character of the plants which clothe the prairie; much more so, indeed, than might at first be inferred from a cursory examination of the prairie flora. On my journey to the Rocky Mountains I was fortunate in making the acquaintance of Professor John Macoun, M.A., F.L.S., the botanist to the Geological and Natural History Survey of Canada, and still more fortunate in being allowed, through this gentleman's kindness and courtesy, to avail myself of his advice and experience, founded on years of arduous labour and exploration in the North West. On my mentioning to Professor Macoun my desire to familiarise myself with the native forage plants of the prairie, and particularly with the grasses and clovers, I was much surprised by his informing me that there is not a single true clover, not one species of the genus *Trifolium*, indigenous to the prairie soil. Nevertheless, the leguminous family, as a whole, is by no means unrepresented on the prairie; and, as a matter of fact, while in Ontario only twenty-six species of *Leguminosæ* have been recorded, no less than forty-two species have been found in the North-West, the most noteworthy of these being, perhaps, the so-called purple prairie clover, *Petalostemon violaceum*; the white prairie clover, *P. candidus*; the purple prairie vetch, *Vicia Americana*; the prairie pea or purple pea-vine, *Lathyrus venosus*; and various milk vetches belonging to the genera *Astragalus* and *Oxytropis*. Though the leguminous herbage of the prairie presents no species identical with those of Britain, the species of *Graminææ*, on the other hand, coincide

in a few cases with native British grasses; but this is the exception rather than the rule. Species of grasses common to both the prairie herbage and the British flora are *Agrostis vulgaris*, *Kaleria cristata*, *Poa pratensis*, *P. annua*, *Triticum repens*, *T. caninum*, and *Hierochloe borealis*. I was surprised at the quantity of couch grass, *Triticum repens*, known in Canada as quick or quack grass, which came under my notice; but Professor Macoun told me that the variety which grows on the prairie is non-stoloniferous, and therefore does not form the bed or couch of interlacing underground stems, which are found so objectionable by the English farmer; it is readily eaten by stock, and constitutes a most valuable grass on all clay and alkaline soils of the prairie.

The following is a list of the chief prairie grasses, arranged alphabetically instead of in botanical sequence:—

Systematic Name.	Common Name.	Usual Habitat.
<i>Agrostis scabra</i> . <i>A. vulgaris</i> .	Tickle grass. Red top or lowland pasture grass.	River banks. Common.
<i>Andropogon scoparius</i> . <i>Brizopyrum spicatum</i> . * <i>Bouteloua oligostachya</i> . * <i>Calamagrostis Canadensis</i> . <i>Danthonia Californica</i> . <i>D. intermedia</i> . <i>D. sericea</i> . <i>D. spicata</i> . <i>Elymus condensatus</i> . * <i>Glyceria airoides</i> . <i>G. distans</i> . * <i>G. tenuiflora</i> . <i>Hierochloe borealis</i> .	Purple wood grass. Spike grass. Buffalo grass. Blue joint grass. Californian oat grass. Prairie oat grass. Silky oat grass. Wild oat grass. "Bunch" grass. Narrow-leaved spear grass.	Sandy slopes. Salt marshes. Dry or sandy plains. Swamps and woods. Cypress hills. Rich prairies. Bow River. Forest openings. Southern plains. Salt marshes.
<i>Hordeum jubatum</i> . <i>Kaleria cristata</i> .	Meadow spear grass. Seneca grass. Holy grass.	Ditto. Ditto. Prairies, very common.
<i>Poa annua</i> . <i>P. caesia</i> . <i>P. pratensis</i> . <i>P. serotina</i> . * <i>P. tenuifolia</i> . <i>Setaria setosa</i> . * <i>Spartina cynosuroides</i> . * <i>S. gracilis</i> . <i>Sporobolus heterolepis</i> . <i>Stipa comata</i> . * <i>S. spartea</i> . <i>S. viridula</i> . <i>Triticum caninum</i> .	Squirrel-tail grass. "Bunch" grass. Annual spear grass. Red top or June grass. Fowl meadow grass. Slender-leaved Poa. "Foxtail." Freshwater cord grass. Graceful salt-marsh grass. Dropseed grass. "Bunch" grass. "Wild oat" buffalo grass. Feather grass. Dog's-tooth grass.	Dry hills and river banks. Around Winnipeg. Prairies. Everywhere. Wet places. Prairies. Prairies. Prairie marshes. Salt marshes. Dry soils. Rather scarce. Everywhere. Ditto. Thickets and river banks.
* <i>T. repens</i> . * <i>Vilfa cuspidata</i> . <i>Zizania aquatica</i> .	Couch grass. Rush grass. Wild rice.	Salt marshes. Damp prairies. Swamps.

As the reader will probably be acquainted with some of these, at least by their common names, it may be well to add a few descriptive details. The true American buffalo grass, unknown in Canada, but common in the states of Kansas and Colorado, is *Buchloe dactyloides*; it throws out numerous runners, like a strawberry, and these, taking root, form new plants. The Canadian buffalo grasses are, *Bouteloua oligostachya*, growing most abundantly in the southern districts, and *Stipa spartea*, which, though found on all the prairies of the North West, is commonest in the northern regions, and particularly on the Buffalo Plains. *Stipa spartea* is the famous grass of the hills in the Bow River country, and forms the bulk of the winter pasture of the great plains. It is allied to the ornamental feather grass, *Stipa pinnata*, of English flower-gardens, and has an awn some seven inches long. The "bunch" grasses are so called from their habit of growing in bunches or tussocks. Our English meadow foxtail, *Alopecurus pratensis*, is neither native nor cultivated in Canada, and the term foxtail is there applied both to the barley grass, *Hordeum jubatum*, and to the millet grass, *Setaria setosa*. The two grasses called red top, *Agrostis vulgaris* and *Poa pratensis*, are found chiefly on the eastern prairies; the latter is also known as the blue grass of Kentucky. The wild rice, *Zizania aquatica*, grows luxuriantly in damp and marshy situations in Northern Manitoba, and it constitutes a delicious article of food. It is quite distinct from, though related to, the common commercial rice, *Oryza sativa*, and its grains are dark coloured.

In some regions of the prairie, and particularly in the more swampy districts, certain sedges enter largely into the composition of the herbage, the following being the commoner ones:—

Systematic Name.	Common Name.	Usual Habitat.
* <i>Carex aristata</i> .	Awned sedge.	Marshes.
<i>C. disticha</i>.	.. ..	Ditto.
* <i>C. lanuginosa</i> .	Woolly fruited sedge.	Ditto.
<i>C. prairea</i> .	Prairie sedge.	Ditto.
* <i>C. marcidia</i>.	.. ..	Open prairies.

One only of these, *C. disticha*, is also British, and a British species of rush, *Juncus Balticus*, the Baltic rush,* is likewise common on the prairie. The sedges constitute much of the prairie hay, and make up the greater part of the vegetation of the ponds and marshes. On the other hand, in the vicinity of woods, wild vetches and peas, and various rosaceous and composite plants, mingle with the grasses and yield excellent prairie hay. The elegant little prairie rose, *Rosa blanda*, which only attains

* This is the wire-grass of Utah.

a height of about six inches, supplies in its hips a much-relished food in the fall of the year to horses and to the prairie chicken; and the composite plant, *Artemisia frigida*, known as "pasture sage," and the general appearance of which resembles that of wormwood, constitutes almost the sole winter food in some localities. *Eurota lanata*, the "white sage," a plant allied to our spinach and goosefoot, is abundant on the tops of dry hills in the southern plains.

The grasses and sedges marked with an asterisk in the foregoing lists, are held to possess special value as forage plants. *Hierochloe borealis*, which is the holy grass of Scotland and Northern Europe, having been formerly used for strewing on the floors of churches at certain seasons, is very general on the prairie, and possesses a pleasant, lavender-like fragrance which it imparts to the prairie hay; the Red Indians plait it into the form of a border to surround the birch-bark mats they are so expert in making. Professor Macoun told me that, on high dry grounds, the best pasture grasses met with are: *Andropogon scoparius*, *Bouteloua oligostachya*, *Hierochloe borealis*, *Poa cæsia*, *P. tenuifolia*, *Sporobolus heterolepis*, *Stipa comata*, *S. spartea* (the best of all), *S. viridula*, *Triticum caninum*, and *Vilfa cuspidata*. The good forage grasses of the salt marshes are: *Glyceria airoides*, *Spartina cynosuroides*, *S. gracilis*, and *Triticum repens*. Horses left to themselves find their chief summer food in *Carex aristata* of the salt marshes; but as this dies with the appearance of frost, the horses then betake themselves to the higher lands, and graze on *Stipa spartea* in the winter. No pastures are more valuable in summer than those of the salt marshes, and working horses when set at liberty make straight for them.

The prairie herbage varies greatly with the locality; in that part of Manitoba north-west of Portage-la-Prairie the hay is very coarse, containing large quantities of *Spartina cynosuroides*, mixed with *Calamagrostis Canadensis* and *Poa serotina*. A western horse accustomed to finer hay will scarcely touch this, while the ponies of the neighbourhood eat it with avidity. On the drier prairie this kind of hay is not seen, while other varieties are abundant. Where ponds abound, much of the hay consists of certain species of *Carex*, *Poa*, and *Calamagrostis*. If the soil is rich and not too moist, the *Carices* disappear, and grasses of the genera *Danthonia*, *Elymus*, *Hierochloe*, *Triticum*, and *Vilfa*, with numerous *Rosaceæ* and *Leguminosæ*, appear in great profusion. The hay in river valleys is almost wholly *Carex aristata*, *Calamagrostis Canadensis*, and *Poa serotina*; this is also the hay of the mixed forest and prairie country.*

* 'Manitoba and the Great North-West.' By John Macoun, M.A., F.L.S.

The nutritive value of the prairie grasses is not only due to their abundant foliage, but in some cases to the production of grain also; and Professor Macoun attributes their eminent feeding properties, not so much to the inherent value of the species themselves, as to the soil and climate in which they are grown. It must not be forgotten that for many centuries the prairie, in the production of buffalo beef, has been simply grazed; how its herbage will submit to the new order of things, in which large tracts are to be mown year after year, remains to be seen. Numerous species of grass, which on the Canadian prairies grow tall enough to be cut for hay, in the drier country south of the political boundary seldom attain a greater height than a few inches. I was told everywhere that during the months of May and June, when most of the plants are in flower, the prairie presents a most lovely sight; nor was it difficult to imagine this after seeing the floral stragglers which still decked the plain in September. As to the life-sustaining capability of the prairie in the winter, I cannot do better than quote the following words,* merely remarking that La Belle Prairie, where Viscount Milton and Dr. Cheadle wintered in 1862-3, is west of Carlton and somewhat north of Battleford, on the North Saskatchewan River, and adding that Dr. Cheadle, in whose company I had the pleasure of travelling across the prairie, has lost none of his enthusiasm with regard to the future of the vast territory which he did so much to make known to his countrymen twenty years ago:—

"We now prepared to leave our winter quarters, as soon as the snow had disappeared sufficiently to admit of travelling with carts. The first thing to do was to find the horses, which had been turned loose at the commencement of the winter. We had seen them or their tracks from time to time, and knew in what direction they had wandered. La Ronde followed their trail without difficulty, and discovered them about eight or ten miles away. We were very much astonished at their fine condition when he drove them back to La Belle Prairie. Although very thin when the snow began to fall, and two of them had been used for sleigh work in the early part of the winter, they were now perfect balls of fat, and as wild and full of spirit as if fed on corn—a most unusual condition for Indian horses. The pasture is so nutritious that animals fatten rapidly even in winter—when they have to scratch away the snow to feed—if they find woods to shelter them from the piercing winds. No horses are more hardy or enduring than those of this country, yet their only food is the grass of the prairies and the vetches of the copes. The milch cows and draught oxen at Red River, and in Minnesota, feeding on grass alone, were generally in nearly as fine condition as the stalled cattle of the Baker Street show."

As the political boundary between the Canadian and the American prairies is of an entirely arbitrary character, being determined simply by the 49th parallel, it is evident that many

* "The North-west Passage by Land." By Viscount Milton, M.P., and W. B. Cheadle, M.D.; Cassell and Co., p. 168.

of the natural history features of the regions north and south of this line may be identical. Particularly is this so with regard to the general character of the flora, so that the following observations from an address of surpassing interest, on the "Characteristics of the North-American Flora," delivered by the veteran American botanist, Professor Asa Gray, before the Biological Section of the British Association at the Montreal meeting last year, may be appropriately quoted here:—

"Between the wooded country of the Atlantic side of the continent and that of the Pacific side, lies a vast extent of plains, which are essentially woodless, except where they are traversed by mountain-chains. The prairies of the Atlantic States bordering the Mississippi, and of the Winnipeg country, shade off into the drier and gradually more saline plains, which, with an even and gradual rise, attain an elevation of 5000 feet or more where they abut against the Rocky Mountains. Until these are reached (over a space from the Alleghanies westward of about 20 degrees of longitude) the plains are unbroken. To a moderate distance beyond the Mississippi the country must have been in the main naturally wooded. There is rainfall enough for forest on these actual prairies. Trees grow fairly well when planted; they are coming up spontaneously under present opportunities; and there is reason for thinking that all the prairies east of the Mississippi, and of the Missouri up to Minnesota, have been either greatly extended or were even made treeless under Indian occupation and annual burnings. These prairies are flowery with a good number of characteristic plants, many of them evidently derived from the plains farther west. At this season (August) the predominant vegetation is of *Compositæ*, especially of *Asters* and *Solidagoes*, and of *Sunflowers*, *Silphiums*, and other *Helianthoid Compositæ*.

"The drier and barer plains beyond, clothed with the short Buffalo-Grasses, probably never bore trees in their present state, except as now, some Cottonwoods (i.e., *Poplars*) on the margins of the long rivers which traverse them in their course from the Rocky Mountains to the Mississippi. Westward, the plains grow more and more saline; and *Wormwoods* and *Chenopodiaceæ* of various sorts form the dominant vegetation, some of them *sui generis*, or at least peculiar to the country, others identical or congeneric with those of the steppes of Northern Asia. Along with this common campestine vegetation, there is a large infusion of peculiar American types, which I suppose came from the southward."

Climate.—The essential connection between the climate of a country and its agriculture renders it indispensable to make some observations on the climate of Manitoba and the North-West Territories, and in this particular case it is all the more desirable, inasmuch as considerable misapprehension and, it may be, prejudice exist in England on the subject. The region under notice is bounded on the south by latitude 49°, on the north by latitude 60°, on the east by the meridian of 95°, and on the west by the Rocky Mountains, and it covers, in round numbers, an area of 668,000 square miles. Much information was obtained in Captain Palliser's expedition in 1857, and many important facts have been subsequently established by Professor

* 'Nature,' Jan. 15, 1885, p. 254.

Macoun. The conditions which determine the climate of the vast continental region occupied by the prairie may be most conveniently studied as the factors of a physiographical problem of national importance. The normal seasons comprise a long, severe, but dry winter, a hot summer with abundant rain, a short pleasant autumn or "fall," and a still briefer spring, which is usually dry and sunny. The opening of spring, as marked by the first appearance of spring flowers, is about the middle of April, the period being practically the same over the entire area. The diurnal temperature rapidly rises, and summer heat prevails till the middle of August, about which time a great and permanent fall in temperature takes place, and autumn sets in; the closing days of this latter season are often very beautiful, and they form the period known as the Indian summer. Winter begins within the first fortnight of November, the navigation of the Red River being closed simultaneously, though the Peace River, much farther north, usually closes later. Unfortunately, our English conceptions of the climate of the Canadian prairie are based almost exclusively on the readings of the thermometer. We hear, for example, of a temperature of 20° below zero on a winter day in Manitoba, and shudder at the bare thought of such extreme severity, as we try to imagine what suffering such a temperature would bring with it in England. But this is where the error creeps in, for the bodily sensations accompanying a temperature of, say, -20° in England, and those associated with the same temperature on the Canadian prairie would be quite different. In fact, the thermometer alone is an insufficient guide; besides knowing the temperature of the air, it is also necessary to know the amount of moisture it contains, before arriving at a conclusion as to the agreeableness or otherwise of the atmospheric environment. Dry air is a bad conductor of heat; moist air is a better conductor, the conducting medium really being the water vapour or water dust which confers the moistness, so that, below the point of saturation, the more moisture the atmosphere contains the more freely will it conduct away heat from the surfaces of the animal body.* On the other hand, the drier the air is, the more completely does it act as an insulator, enveloping the animal body in a medium which conserves the animal warmth in so far as it offers no facility for the escape of the latter by conduction. These simple physical facts supply the reason that the winter temperatures of the

* "Varying amounts of moisture in the air materially affect the health and comfort of man. . . . Moist air is a better conductor of heat than dry air, which accounts for much of the discomfort felt in winter when a thaw takes place as compared with the feeling of elasticity when the air is dry. In cold weather, therefore, moist air cools down the skin and lungs more rapidly than dry air, and colds consequently result."—"On some relations of Meteorological Phenomena to Health." By John W. Tripe, M.D., F.R.Met. Soc.

Canadian prairie, though undoubtedly low, are yet tolerable. All over the prairies the air in winter is dry, and hence is physically different from the humid atmosphere which is associated with our insular position in this country. The dry air of the prairie performs for a man in the winter the services of a blanket; it cannot, any more than the blanket, bestow heat upon the man's body, but it can, equally with the blanket, prevent the dissipation of the warmth of the body. No doubt, if the winter temperatures of Manitoba and the North-West were associated with humidity at all approaching that of our English atmosphere, the effect would be well-nigh intolerable. Last autumn Professor Glaisber, in travelling across the prairie, made a series of observations with the dry and wet bulb thermometer. At Portage la Prairie the dry bulb registered 80° and the wet bulb 67°. The next day, at Swift current, the readings were 91° and 72° respectively. In fact, throughout the journey there was a difference between the readings ranging from 10° to 19°. To this low percentage of moisture in the air is attributed the peculiar hardness, or flintiness, of the wheat grown in Manitoba and the North-West, a property of the grain which renders it peculiarly valuable in milling operations.

The Report of the Department of Agriculture and Statistics of the Province of Manitoba for the year 1882 is specially valuable, in that it contains the results of eleven years' meteorological observations, from 1871 to 1881 inclusive. The record would extend back to earlier dates, but that the observer, Mr. James Stewart, had the misfortune to lose everything at the time of the Red River Rebellion. From the years recorded, I have selected, quite at hazard, the year 1879, and constructed the following table, an examination of which may prove of interest, it being remembered that the freezing-point is at 32° F.:

TEMPERATURE OBSERVED at WINNIPEG, 1879.

	Mean.	Mean Maximum.	Mean Minimum.	Highest Maximum.	Lowest Minimum.	Mean Height of Barometer.
	Degrees.	Degrees.	Degrees.	Degrees.	Degrees.	Inches.
January ..	- 2·3	7·7	- 14·3	29·5 on 26th	- 34·3 on 14th	29·1918
February ..	- 5·2	5·3	- 18·1	28·5 on 21st	- 43·6 on 26th	29·2979
March ..	14·2	27·0	- 1·6	50·0 on 30th	- 22·4 on 16th	29·1458
April ..	40·1	50·7	28·1	71·5 on 21st	- 10·3 on 3rd	29·2126
May ..	53·5	66·4	41·4	78·5 on 28th	28·3 on 6th	29·1886
June ..	64·5	75·7	51·1	88·3 on 3rd	33·0 on 1st	29·0256
July ..	67·9	80·7	56·3	93·0 on 12th	48·4 on 29th	29·0375
August ..	64·2	76·4	52·0	87·5 on 9th	40·3 on 20th	29·0784
September	51·3	65·3	38·6	77·5 on 4th	22·3 on 24th	29·1536
October ..	44·4	57·2	31·2	88·5 on 6th	5·2 on 30th	29·0663
November	20·5	29·4	10·0	48·4 on 6th	- 10·3 on 20th	29·1650
December ..	-12·8	- 4·8	- 24·1	17·4 on 31st	- 50·5 on 24th	29·3210

The coldest day of the year appears to have been the 24th of December, when the highest reading of the thermometer was -28.4° , and the lowest -50.5° .

The following table contains further information relating to the same year:—

METEOROLOGICAL OBSERVATIONS at WINNIPEG, 1879.

	Rainfall.	Snowfall.	Total Rain and Melted Snow.	Days on which Rain fell.	Days on which Snow fell.	Number of Fogs.	Number of Thunder- storms.
	Inches.	Inches.	Inches.				
January ..	0	16.72	1.555	0	9	0	0
February ..	0	7.30	0.655	0	6	0	0
March ..	0.210	5.30	0.625	1	3	1	0
April ..	1.970	2.65	2.230	10	1	1	1
May ..	2.785	0	2.785	14	0	0	5
June ..	7.050	0	7.050	15	0	0	10
July ..	3.765	0	3.765	18	0	0	15
August ..	1.820	0	1.820	12	0	2	6
September	0.740	0	0.740	10	0	1	0
October ..	1.420	0	1.420	9	0	2	0
November ..	0.050	3.70	0.300	2	7	1	0
December	0	24.23	2.290	0	13	1	0
Total ..	19.810	59.90	25.235	91	39	9	37

But perhaps the best general idea of the climate may be derived from an examination of the Table on page 26, in which are summarised the results of eleven years' observations. In that Table the total annual amount of aqueous precipitation must, of course, be looked for in the line devoted to "total rain and melted snow," as, in making up these numbers, the fall of snow is rendered into its equivalent of water.* It will be seen that, on an average, the waters of the Red River are open for navigation during seven months of the year, so that the winter season extends over five months. Mr. James Stewart, of St. Andrews, Manitoba, in presenting to the Deputy Minister of Agriculture and Statistics the figures upon which the three tables here given are based, makes use of the following remarks:—

"The climate of this country, I believe, is the finest in the world. On account of the bracing dry atmosphere the fluctuations of the temperature are not inconveniently felt, as is the case in places where the atmosphere is more humid. The warm days in summer are generally followed by cool evenings, and such a thing as very sultry and oppressive heat is scarcely known. The warm days, followed by cool nights and copious dews, facilitate the growth of cereals in a wonderful degree. The winters here are also very pleasant and bracing, proceeding from the same cause, namely, the dryness of our atmos-

* "On a very rough estimate a foot of snow yields about an inch of rain."—*'Meteorology.'* By R. H. Scott, F.R.S.; Kegan Paul and Co., Third Ed., p. 1

GENERAL AVERAGE OF METEOROLOGICAL OBSERVATIONS taken at WINNIPEG daily, from 1871 to 1881, inclusive.

	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.	Mean for 11 Years.
Mean Height of Barometer (in Inches)	29.1369	29.1131	29.1235	29.1451	29.1474	29.3191	29.1517	29.0993	29.1520	29.1385	29.1520	29.1530
Mean Tempera- ture (in De- grees)	32.43	32.84	32.29	31.85	29.63	31.34	36.88	36.96	33.36	31.82	34.30	33.06
Maximum Tem- perature	100.3	99.5	94.3	94.5	94.3	95.0	95.0	94.5	93.0	90.3	98.0	95.34
Minimum Tem- perature	-40.3	-41.0	-36.0	-38.7	-41.6	-43.0	-44.3	-25.3	-50.5	-44.4	-40.5	-40.51
Rainfall (in Inches)	15.600	21.620	13.580	14.988	12.280	22.950	22.034	24.135	19.810	21.683	8.055	16.977
Snowfall (inches)	51.50	73.02	96.85	86.17	47.11	74.21	30.30	34.44	57.00	58.19	80.19	52.72
Total Rain and Melted Snow	20.175	30.170	17.040	18.314	16.847	29.184	24.608	29.516	25.235	27.166	18.034	23.304
Number of Days on which Rain fell	56	54	61	47	68	68	78	81	91	76	79	69
Number of Days on which Snow fell	48	46	55	42	57	46	29	34	39	46	49	45
Number of Fogs	17	9	6	8	2	8	16	5	9	7	11	9
Number of Thun- derstorms	27	27	24	31	13	28	25	17	37	33	29	27
Navigation opened on Red River	Apr. 26	May 2	Apr. 26	Apr. 30	Apr. 29	Apr. 24	Apr. 22	Mar. 20	Apr. 12	Apr. 21	Apr. 24	Apr. 20
Navigation closed on Red River	Nov. 10	Nov. 12	Oct. 28	Nov. 11	Nov. 4	Nov. 13	Nov. 6	Nov. 27	Nov. 1	Nov. 12	Nov. 14	Nov. 13

phere . . . As a rule the rains are chiefly in the months of May and June, the time they are most wanted for vegetation, while the fall months are generally dry, so that rarely any difficulty is experienced in harvesting the crops. The months of September, October, and November are looked upon as the finest season of the year, being remarkable for fine cool dry weather, unknown, I believe, in any other country."

A description of the climate of the Canadian North-West can hardly be deemed satisfactory unless it includes an examination of the more general physiographical phenomena which combine to render that climate what it is, and I therefore propose to make a brief reference to the phenomena in question. The general rule that the temperature increases as the equator is approached, or as the poles are receded from, is liable to many local variations, determined chiefly by the relative disposition of land and sea. If places which have the same average annual temperature are joined together on the map, the line so drawn is called an isothermal line, and sometimes the isothermals are fairly parallel with the equator. But there are many exceptions, and a notable one occurs in the case of the Canadian North-West, where, between the meridians of 100° and 120° , the isothermals rise very considerably to the north, the physical significance of which is that the North-West enjoys a much higher average temperature than many other parts of the globe in the same latitude.

"The line of equal mean temperature, especially for the season of vegetation, between March and October, instead of following lines of latitude, bends from the Mississippi valley far to the north, carrying the zone of wheat from Minnesota away to the 60th parallel in the valley of the Peace River, reproducing the summer heats of New Jersey and Southern Pennsylvania in Minnesota and Dakota, and those of Northern Pennsylvania and Ohio in the valley of the Saskatchewan. Within the isothermal lines that inclose the zone west and northwest of Minnesota, which is being or is soon to be opened to cultivation, lies a vast area of fertile lands from which might easily be cut out a dozen new States of the size of New York."*

At Fort Vermilion, $58^{\circ} 24' N.$ and $116^{\circ} 30' W.$, Professor Macoun found barley cut on August 6th, 1875, and wheat almost ripe, and this, be it observed, in a latitude coincident with that of the extreme north of Scotland. In Blodgett's 'American Climatology' it is stated that the buffalo winters on the upper Athabasca at least as safely as in the latitude of St. Paul, Minnesota, and the spring opens at nearly the same time along the immense series of plains extending northward from the city of St. Paul to the Mackenzie River. Again, meteorological observations show that Winnipeg and Fort McLeod, 600 miles apart, but in the same latitude, have about the same temperature, while Fort

* J. W. Taylor, United States Consul at Winnipeg. Quoted in Macoun's 'Manitoba and the Great North-West,' p. 162.

Simpson, 770 miles due north of Fort McLeod, is warmer. To understand thoroughly the climate of the North-West we must pass beyond the artificial boundary at the south of the Dominion. On the other side of this line (lat. 49°) there is, in the United States territory, a vast region of arid country, covering an area of about half a million square miles, and occupying a general elevation of about six thousand feet. Over this, the Great American Desert, as it is called, the moisture-laden winds flowing northward from the Gulf of Mexico, have to pass on their way to the Canadian prairies—"south-west winds come across the dry, hot plains west of the Mississippi."* Any cause which tends to reduce the temperature of the atmosphere thereby lessens its capacity for moisture, so that when an atmospheric current is sufficiently cooled, its vapour is usually precipitated in the form of rain. But, in summer time, the heat arising from the burning plains of the American Desert is so great that the northward flowing air-currents retain their temperature, and therefore their moisture, and it is not till the winds encounter the cooling influence of the grass-covered plains of the prairie that their temperature becomes sufficiently reduced to allow of the precipitation of their moisture in the beneficent showers of rain which constitute so marked and so essential a feature in the meteorology of the North-West. The American desert is thus the indirect cause of the summer showers of the prairie, as, were it not for this desert, the air currents from the south would probably be deprived of their moisture long before they reached the North-West. But this same desert is in winter the cause of that dryness of the atmosphere which renders the winter climate of the prairie so much less trying than it otherwise might be, for at this season the "suspension of those desert effects which gave the summer rains," in other words, the cooling of the desert, induces the main air-currents from the Gulf of Mexico to trend to the east. This change of direction takes them over the region of the great lakes, where they deposit an abundant rainfall.†

"*Bad Lands.*"—The area within which is comprised what I have referred to under the name of the Great American Desert is not described as "desert" by the American geographers. The region in question extends over considerable portions of the States of Nebraska, Colorado, Wyoming and Utah, between the latitude of Santa Fé (36° N.) and that of Cheyenne ($41\frac{1}{2}^{\circ}$ N.), and between the meridians of 99° and 111° W. Much of it is occupied with what are known as "bad lands," and it is these, with their arid climate and scant vegetation, which impart the desert character. They also extend around the Uinta Mountains,

* Ansted, 'Phys. Geogr.,' Fifth Ed., p. 295.

† 'Manitoba and the Great North-West,' p. 150.

in latitude 41°, due east of Salt Lake City, and in this locality were traversed by the original settlers in that city before their eyes were gladdened with a sight of the "promised land." I cannot do better than let the American geologists describe these "bad lands" in their own words:—

"In the arid region of the western portion of the United States, there are certain tracts of country which have received the name of *mauvaises terres*, or bad lands. These are dreary wastes—naked hills, with rounded or conical forms, composed of sand, sandy clays, or fine fragments of shaly rocks, with steep slopes, and, yielding to the pressure of the foot, they are climbed only by the greatest toil, and it is a labour of no inconsiderable magnitude to penetrate or cross such a district of country.*

"The vast plains to the west of Cheyenne are covered with the drab-yellow and light-gray sands, marls, and clays of the great freshwater lake deposit, known as the 'bad lands.'†

And Dr. S. Aughey, in his report on the superficial deposits of Nebraska, describes the bad lands in a manner which I have only space to briefly summarise. He says they do not really belong to the surface deposits, as they constitute a peculiar formation, where most of the soil capable of being cultivated has been removed by denudation. They belong to what Hayden calls the White River group of Tertiary rocks, and are believed to be of Miocene age. The materials of the deposits are white and yellowish indurated clays, sands, and marls, with occasional thin beds of lime and sandstones. "The geologist never tires of investigating these deposits and their curious remains. The almost vertical sections of variously-coloured rock have been chiselled by water agencies into unique forms. Indeed, viewed from a short distance they remind the explorer of one of those old cities which only exhibit their ruins as reminders of their ancient greatness. Among these grand desolations, the weird, wild old stories of witchery appear plausible and possible. It is in the deep cañons at the foot of stair-like projections that the earliest of those wonderful fossil treasures are found which have done so much to revolutionise our notions of the progress of life and of Tertiary times." "Agriculture in such a region as this," adds Dr. Aughey, "where often nothing is now growing, is, of course, out of the question. Whether there ever will be such an increased rainfall as to start vegetation in this region and make its surface capable of cultivation, is a problem of the future."‡

* 'Exploration of the Colorado River of the West.' Washington: Government Printing Office, 1875, p. 149.

† 'United States Geological and Geographical Survey of the Territories, for 1873.' By F. V. Hayden; Washington, 1874, p. 17.

‡ 'United States Geological and Geographical Survey of Colorado and Adjacent Territory, 1874.' By F. V. Hayden, U.S. Geologist; Washington: Government Printing Office, 1876, p. 262.

MANITOBA.

The Province of Manitoba is merely the frontier of the great North-West. Formerly known as the Red River Settlement, it was in 1870, at the close of, and as a consequence of, the Red River Rebellion, the suppression of which was effected by Colonel (now General Lord) Wolseley, raised to the dignity of a separate Province and admitted into the federation of the Dominion. Its boundaries are determined by the parallels of 49° and 53° N. lat., and the meridians of 90° and 101° W. long. It is in the very centre of North America, and, in the words of the Earl of Dufferin, "may be regarded as the keystone of that mighty arch of sister Provinces which spans the Continent from the Atlantic to the Pacific." Its area, 123,000 square miles,* is slightly in excess of that of the British Isles, 121,115 square miles; but the population of the Province is only about 125,000, of which Winnipeg, the capital, claims 30,000. This city is most advantageously placed at the confluence of the Red and Assiniboine Rivers, occupying the site of the old Fort Garry, one of the head-quarters of the Hudson's Bay Company, and though the fort is now unfortunately destroyed, its name will linger in history as that of the place where the insurrection of the French-Indian half-breeds culminated, under the leadership of Louis Riel, in the Red River Rebellion of 1869-70. The great obstacle to the growth of Winnipeg, and with it the development of Manitoba, arose from its inaccessibility. The country between Lake Superior and the prairie metropolis has already been described, and it occupied Colonel Wolseley and his troops three months (May to August, 1870) to traverse this region, whereas the journey across the same district, from Port Arthur to Winnipeg, is now accomplished by the Canadian Pacific Railway in less than twenty-four hours. The first railway communication with Winnipeg was effected in the spring of 1879 through American territory, viâ Chicago, and the St. Paul, Minneapolis, and Manitoba Railway, and this at once gave an enormous impetus to business enterprise. But it was not till the winter of 1883 that the railway between Port Arthur and Winnipeg was completed, and then, for the first time in history, it was possible to gain railway access to Winnipeg without leaving Canadian territory.

"The chief rivers emptying into Lake Winnipeg are the Winnipeg, the Red, and the Saskatchewan. The Assiniboine River, navigable from 250 to 350

* By a recent decision, however, of the Judicial Committee of the Privy Council, an extensive area of land, lying to the north and north-west of Lake Superior, the possession of which was disputed by the Provinces of Manitoba and Ontario has been awarded to the latter.

miles for steamers of light draught, enters the Red River 45 miles from Lake Winnipeg, and at the confluence of the rivers ("the Forks") is situated the city of Winnipeg. The Winnipeg, which flows from the territory lying south-east of Lake Winnipeg, is a noble river some 200 miles long, that after leaving the Lake of the Woods, dashes with its clear water over many cascades, and traverses very beautiful scenery. At its falls from the Lake of the Woods is one of the greatest and most easily utilised water-powers in the world (at Rat Portage). Like most rivers in the New World, the Red River is at intervals of years subject to freshets. In the 70 years' experience of the Selkirk colonists there have been four "floods." The highest level of the site of the city of Winnipeg is said to have been under 5 feet of water for several weeks in May and June in 1826, under 2½ feet in 1852, not covered in 1861, and only under water on the lowest levels in 1882. The extent of overflow has thus on each occasion been less. The loose soil on the banks of the river is every year carried away in great masses, and the channel has so widened as to render the recurrence of an overflow unlikely. The Saskatchewan, though not in the Province, empties into Lake Winnipeg less than half a degree from the northern boundary. It is a mighty river rising in the Rocky Mountains, and crossing 18 degrees of longitude. Near its mouth are the Grand Rapids. Above these, steamers ply to Fort Edmonton, a point upwards of 800 miles north-west of the city of Winnipeg. Steamers run from Grand Rapids, through Lake Winnipeg, up Red River to the city of Winnipeg.*

At the time of the Rebellion, in 1870, the population of Winnipeg was 300; eleven years later it had risen to 9000; in the following year, 1882, it rose to 21,000, and there are now 30,000 inhabitants. The total annual assessment of the city in 1878 was 670,000*l.*, whereas last year it had risen to 7,600,000*l.*, and the preceding year it was even higher. In fact, the opening up by railways of the vast territory of which Winnipeg is, and must continue to be, the head-quarters, led to a "boom" amongst speculators, the reaction from which is still felt, though happily it is dying away.

If a stranger should happen to be in Winnipeg on a wet day, as it fell to my lot to be, he will carry away with him a memento of the city which is likely to make a lasting impression, if not on his mind, at least on his garments. I know in my case it did. It is the Winnipeg mud. Most of the roads are rivers of mud when the weather is wet, and the oxen in the Red River carts, and the unfortunate horses, seem quite accustomed to stand shoulder-deep in the mire. As I was out and about all day long, I received a very liberal plastering of that mud. I had it operated on in Toronto, in Montreal, in Quebec, in Halifax, in St. John, in Boston, in New York, till the cents began to mount up into dollars, and still that mud clung. In Liverpool, and again in London, the attack was renewed, but the indelible stains remained. Baffled and disheartened, I abandoned the struggle—I abandoned the garments too. It was suggested to

* 'Encyc. Brit.,' Ninth Ed., 1883, Art. "Manitoba."

me that the slime in the roads afforded strong indications of the fertility of the soils in the Red River valley, but the illustration is one that might profitably be dispensed with. The condition of its roads is a reproach to Winnipeg, but it is one which its enterprising citizens will no doubt soon make a thing of the past.

I have spoken of the Red River cart, a remnant of bygone days. The Marquis of Lorne says * :—

“It is a very rough structure, but ingeniously made, for its wheels are put together without one piece of iron. There is neither nail nor metal tire.

Fig. 1.—*The Red River Cart.*

(From ‘Canadian Pictures,’—by permission.)



The thing creaks horribly, but answers its purpose well. Caravans of these conveyances have for the last thirty years taken the half-breed's goods by the prairie trails to all parts of the great valleys, and often occupy 90 days in getting to Edmonton."

The word Manitoba means the land of the great spirit, and is of Indian origin. In pronouncing the word, the dwellers in the Province, I noticed, place the accent on the third syllable, and not on the last, as is sometimes heard in England. The tide of emigration to this Province during the last six or eight years has made the name very familiar to English agriculturists, and in the course of an eloquent address upon Manitoba by the Earl of Dufferin, during his tenure of the office of Governor-General

* 'Canadian Pictures,' p. 136.

of Canada, on the occasion of his Lordship's visit to Winnipeg, in August, 1877, the following words occur:—

"It was here that Canada, emerging from her woods and forests, first gazed upon her rolling prairies and unexplored North-West, and learnt, as by an unexpected revelation, that her historical territories of the Canadas, her eastern seaboard of New Brunswick, Labrador, and Nova Scotia, her Laurentian lakes and valleys, corn lands and pastures, though themselves more extensive than half-a-dozen European kingdoms, were but the vestibules and ante-chambers to that till then undreamt of Dominion, whose illimitable dimensions alike confound the arithmetic of the surveyor and the verification of the explorer.

"It was here that, counting her past achievements as but the preface and prelude to her future exertions and expanding destinies, she took a fresh departure, received the afflatus of a more imperial inspiration, and felt herself no longer a mere settler along the banks of a single river, but the owner of half a continent, and in the magnitude of her possessions, in the wealth of her resources, in the sinews of her material might, the peer of any power on the earth."

The reason that Manitoba remained so long unnoticed, and practically unknown by the outer world, was undoubtedly the difficulty of getting to the Province. Viscount Milton and Dr. Cheadle, writing some six or seven years previous to the Red River Rebellion, observed * :—

"The farmers of Red River are wealthy in flocks, and herds, and grain, more than sufficient for their own wants, and live in comparative comfort. The soil is so fertile, that wheat is raised year after year on the same land, and yields 50 and 60 bushels to the acre, without any manure being required. The pasturage is of the finest quality, and unlimited in extent. The countless herds of buffalo which the land has supported are sufficient evidence of this. But, shut out in this distant corner of the earth from any communication with the rest of the world—except an uncertain one with the young State of Minnesota by steamer during the summer, and with England by the Company's ship which brings stores to York Factory, in Hudson's Bay, once a year—the farmers find no market for their produce."

And it is possible that some of the soldiers who served in the Red River Expedition regret they did not seize the opportunity which, according to the following remarks of the Marquis of Lorne, was offered to them † :—

"Many speak as though the experience of farming in the province of Manitoba dated only from yesterday; but this is not the case, for Lord Selkirk many years ago brought in a colony consisting of Scotchmen from his estates in the north, taking them by Hudson's Bay up the Nelson River to Lake Winnipeg, and then settling them not far from where the present city stands (then called Fort Garry), at a place named Selkirk. It is curious how few of the members of that force under Sir Garnet Wolseley, which put down the half-breed insurrection in 1870, seem to have been sufficiently impressed by the experience of the Selkirk settlers, for the soldiers were not desirous to take

* 'The North-west Passage by Land,' p. 39.

† 'Canadian Pictures,' p. 137.

up the land allotment which was offered to every member of the expeditionary corps. Yet if they had remembered how the early pioneers had told them that the wheat grown on their lands came to a total of about 30 bushels per acre in each year, and that these corps were raised giving the land a time of rest every fifth year only; if they could have realised within how short a time those places which they themselves had reached with so much toil by march and canoe portage, through woods and endless lakes, would not only be reached by railways, but become great railroad centres, they would not so carelessly have thrown away their chance of making a fortune. When I was at Winnipeg in 1881 the city had scarcely 10,000 people; now it has 30,000. The streets are full of life. Excellent shops, large warehouses, and some handsome churches have been erected. The great want is a good pavement, for the soil is a tenacious black stuff, which clogs and sticks to everything it touches after rain. Fortunately it soon dries, and in the neighbourhood of the town the prairie sod gives good surface for anything but heavy traffic."

The provincial authorities in Manitoba are acting wisely in fostering and guiding the development of agriculture. The periodical and other publications issued under the authority of the Minister of Agriculture, Statistics, and Health, are very useful, and, provided the farmers of Manitoba will study them, cannot fail to prove of excellent service. The 'Manual of Acts and Orders in Council relating to the Department of Agriculture, Statistics, and Health,' issued in 1884, indicates very clearly the kind of bureaucratic control which guides the progress of agriculture. It is enacted that all that part of the administration of the government of Manitoba which relates to agriculture, immigration, statistics, and the public health, including hospitals, shall be under the control of the Department, which shall be administered and managed by the Minister, who may decide all matters of doubt or dispute as to the construction or working of the Act, his decision being final, except that an appeal may be made to the Lieutenant-Governor-in-Council. It is the duty of the Department to institute inquiries and collect facts and statistics relating to agricultural, manufacturing, or other interests of the Province, to adopt measures for circulating and disseminating the same in such manner and form as may be found best adapted to promote the progress of the Province, and to encourage immigration from other countries. Certain persons are bound under a penalty of 4*l.* to furnish information to the Department when such is asked for; they comprise all officers of the Board and Council, the officers of all electoral division agricultural societies, continued or organised under the Act, and of all municipal councils, school boards, boards of trade, and other public institutions, railway, navigation, and other incorporated companies, and all public officers of the Province, and all medical practitioners and veterinary surgeons; they are required from time to time to collect and tabulate facts according to instructions to be furnished them from the Department, and

to make diligent efforts to supply correct information on all questions submitted to them.

The special agricultural functions of the Department are entrusted to the Board and Council of Agriculture. The Board is composed of one representative from each electoral division, appointed by the Lieutenant-Governor-in-Council from among the agriculturists of note in the Province. They are entitled to no compensation for services other than for expenses occasioned by presence at meetings of the Board or Council, the sum for which is fixed by the Lieutenant-Governor-in-Council. Seven form a quorum, and a meeting for the despatch of business must be held on the third Wednesday of February in each year, in Winnipeg. Special meetings are held when extraordinary circumstances arise to necessitate such. A member absent from two consecutive meetings forfeits his membership, unless excused from attendance by resolution of the Board passed at the second meeting from which he may be absent. The duties of the Board are to advise the Department on all matters relating to the agricultural interests of the Province; to organise agricultural and industrial exhibitions open to competition from all parts of the Province; to arrange, when practicable, for the representation of the products of the Province at exhibitions in other provinces or in other countries; to supervise the management of electoral division agricultural societies, and generally to adopt every means possible to promote improvement in the agricultural interests of the Province. The Board may, subject to the approval of the Lieutenant-Governor-in-Council, pass bye-laws to regulate its proceedings, and for other purposes not inconsistent with the provisions of the Act.

The Council of Agriculture consists of six members of the Board elected at each annual meeting by ballot. They have full power to act for and on behalf of the Board, and all grants of money, subscriptions, or other funds, made to or for the use of the Board, are expended under their direction. They meet as circumstances may require, at the summons of the Secretary-Treasurer of the Board, under orders from the Minister or President of the Board. Three form a quorum, and vacancies in the Council are filled by the remaining members thereof. Absent members are dealt with on the Council the same as on the Board. The President and Vice-President of the Board are elected by ballot from among the members at each annual meeting. They are *ex-officio* members of Council, and the President or, in his absence, the Vice-President, presides at all meetings of the Board and of the Council. Failing both, a temporary chairman is elected from among the members present.

The Board may establish, carry on, and manage a veterinary college for the instruction of pupils, by competent and approved teachers in the science and practice of the veterinary art, and may arrange for the examination of such pupils in anatomy, physiology, materia medica, therapeutics, chemistry, and as to the breeding of domesticated animals; and, upon proof to the satisfaction of the Council, that such pupils possess the requisite qualifications, may grant diplomas under the seal of the Board, and the signature of the President and Secretary-Treasurer thereof, certifying that they are competent to practise as veterinary surgeons. A register is kept of veterinary surgeons practising in the Province, and any person acting as a veterinary surgeon without being duly qualified is liable to a fine of from 4*l.* to 20*l.*

The Council must authorise the organisation of an agricultural society in any electoral division in which there may not be one in existence, after a petition—signed by at least fifty persons, each of whom must have actually paid in to the secretary-treasurer *pro tem.* not less than one dollar (4*s.* 2*d.*),—has been filed in the Department in the form set forth in the Act. The objects of such societies are generally to promote the progress of agriculture by holding exhibitions at which prizes may be awarded for live-stock, agricultural and horticultural products, implements, and machinery; and for any excellence in agricultural productions or operations, by importing or otherwise procuring seeds, plants, and pedigree animals of new and valuable kinds, or by offering bonuses for the introduction of the same; by offering prizes for essays on questions relating to agriculture, arboriculture, or horticulture; by promoting the circulation of agricultural, arboricultural, and horticultural publications; and by holding meetings for discussion, and securing the delivery of lectures on subjects connected with agriculture, arboriculture, or horticulture.

The protection of game comes within the functions of the Department, and an enumeration of the close times will carry with it an indication of the animals included in the restrictions. None of the following are to be shot at, hunted, trapped, taken or killed within the times specified: (a) All kinds of deer, including cabri or antelope, elk or wapiti, moose, reindeer or cariboo, or the fawns of such animals, between January 1 and October 1. (b) The varieties of grouse commonly known as prairie chicken, or pheasants, and partridges, between January 1 and September 1. (c) Woodcock, plover, snipe, and sandpipers, between January 1 and August 1. (d) Any kind of wild duck, sea-duck, widgeon, teal, wild swan or wild geese, except the variety of wild geese commonly known as snow

geese or waveys, between May 1 and August 15. (e) Otter, fisher or pekan, beaver, muskrat and sable, between May 15 and October 1. (f) Mink and marten between April 15 and November 1. No person is allowed to hunt with dog, gun, net or otherwise, within the enclosed grounds or lands of another without first obtaining permission from the owner, agent, or occupant of such grounds or lands. In order to encourage persons who have imported, or may import, different kinds of game with the desire to breed the same on their own lands, no person is allowed to hunt, shoot, kill or destroy any such game without the consent of the owner of the property wherever the same may be bred. Most of the wild birds are protected by law against capture, destruction, or injury, and, excepting the birds whose close times have already been enumerated, it is illegal to take, kill, or injure any birds save the following, which are unprotected: eagles, falcons, hawks, owls, wild pigeons, blackbirds, kingfishers, jays, crows, ravens, snow buntings or snow birds, shrikes, bitterns, curlews, cranes, grackles, cormorants, gulls, mergansers, pelicans, and loons. The penalty for infringing any of the bye-laws for the protection of game is a fine of from 2*l.* to 10*l.*, and costs.

To assist in carrying out the stringent regulations relating to the diseases of animals, the Lieutenant-Governor-in-Council appoints, from time to time, as officers of the Department, one or more veterinary surgeons qualified to practise in the Province, and each person so appointed is known as a district veterinarian, because he has a certain district assigned to his jurisdiction. Any such veterinarian may at any time enter any common, field, stable, cowshed, or other premises where he has reasonable grounds for supposing that any animal affected with infectious or contagious disease is to be found. The penalty for impeding or obstructing such entry is a fine of 20*l.* The veterinarian, considering a place to be infected, sends, with all speed, a copy of his certificate to the Department; and if it appears that contagious or infectious disease exists, as declared by the veterinarian, the Minister may so determine and declare, and may prescribe the limits of the infected place, and may from time to time extend or curtail such limits by means of notice in the 'Manitoba Gazette.' If any animal, hide, skin, hair, wool, horn, hoof, offal, carcass, meat, dung, hay, straw, litter or other thing, is moved in contravention of the rules with respect to infected places, the offender is liable to a fine of 20*l.* A similar penalty is incurred by any owner, breeder, or dealer, or by any veterinary surgeon who, on perceiving the appearance of infectious, or contagious disease, fails to give immediate notice in writing to the Department at

Winnipeg, and to the veterinarian for the district. A like penalty is inflicted on persons who expose infected animals, or the remains of such animals, and on persons who violate such regulations for quarantine as may be made by the Lieutenant-Governor-in-Council. In cases in which animals are ordered to be slaughtered a compensation amounting to two-thirds the value of the animal may be claimed, but such value is in all cases to be determined by the Minister; while if the owner or his representative has been guilty of an offence against any of the provisions of the Act, no compensation is allowed. Any horse or other animal affected with glanders or farcy is to be destroyed, and the carcass burnt or buried to the satisfaction of the district veterinarian. Every steamboat, railway and other company, and every person carrying animals for hire in the Province, must thoroughly cleanse and disinfect, in such manner as the Lieutenant-Governor-in-Council may from time to time direct, all steamers, vessels, boats, pens, carriages, trucks, horse-boxes and vehicles used by such company or person for the carrying of animals. In the case of non-compliance a fine of 20*l.* is incurred.

It is easier to prevent the spread of noxious weeds in a new country than in one where the soil has been long under cultivation, but even in a new country it is difficult unless there is concerted action over a wide area. This, however, is the case in Manitoba, and it may perhaps surprise English farmers to know that there every owner or occupier of land must cut or cause to be cut down, or otherwise destroyed, all wild mustard, wild oats, and Canada thistles growing thereon, so often in each and every year as is necessary to prevent their going to seed; and if any owner or occupier of land allows any such wild mustard, wild oats, or Canada thistles to grow thereon and the seed to ripen so as to cause or allow the spread thereof, he is liable to a fine of from 2*l.* to 5*l.* for every such offence. Public roads and highways are placed under the charge of overseers or pathmasters appointed by the Municipal Councils before March 1st each year; and if any Municipal Council fails to make the necessary appointments these latter are made by the Minister, and the funds of the municipality charged with the cost. Besides clearing the highways, the pathmaster watches all lands within his district, and gives notice to the owner or occupier of any land whereon it is apparent that the weeds specified need cutting. If such weeds are not cut within five days the responsible party is fined, as already mentioned, and is further mulcted in the sum of 1*l.* for every day after the five during which the weeds may be neglected. Station-masters are similarly responsible for weeds on railway

property, after being notified by the town clerk. Unoccupied lands are cleared of weeds by the overseer or pathmaster, and the owner is bound to pay such expenses as are thereby incurred. The overseers or pathmasters are subject to the control of one or more inspectors of noxious weeds appointed by the Minister. Seed merchants are not exempt from the law, for it is enacted that any person who vends for seed purposes any grain, grass, or other seed among which there is any seed of wild mustard, wild oats, or Canada thistles, shall be liable to a fine of not less than 2*l.*, nor more than 20*l.* Wild mustard, I may observe, is identical with the charlock of arable lands in England, and this weed-pest was introduced into Canada from Europe, and is there finding its way into all cultivated lands. The Canada thistle, *Carduus arvensis*, is, despite its name, another naturalised plant which has become a pestilent weed on all badly cultivated farms, and in Ontario it renders some of the country roads almost impassable in summer; it is a common weed in England, growing to a height of from two to four feet, and distinguished by its dingy purple flowers and more or less cottony stem. The term "wild oats" is vague, and probably includes several objectionable grasses, of which *Avena fatua* may possibly be one; on the western prairies, however, the name is given to one of the most valued of the buffalo grasses.

Last summer the Department of Agriculture of Manitoba issued a monthly Crop Bulletin, embodying a summary of the reports returned to the Department in accordance with a regulation already referred to. These bulletins, which are highly creditable productions, are prepared by the Deputy Minister, Mr. Acton Burrows, and addressed by him to the Minister of Agriculture, Statistics, and Health, at present the Hon. A. A. C. La Riviere, M.P.P. Each bulletin opens with a report on the weather, embracing a series of observations on the meteorology of the preceding month. This is followed by reports on the progress and prospects of field crops, given under such heads as wheat, oats, barley, potatoes, field roots, hay, general prospects, with notes on pests and noxious weeds, succeeded by reports on live-stock, under the heads of horses, cattle, sheep, pigs, and poultry; and further information is given on such subjects as wild bees, labour, prairie fires and timber. The bulletin is usually supplemented with a summary of the agricultural prospects in the United States and the United Kingdom. In the circulars sent out by the Department, and from the replies to which the bulletin is made up, correspondents are asked to describe the weather, mentioning generally the rainfall, temperature, &c., and suitability for growth and harvest; to state generally the quality of the hay crop, and the condition in

which it was saved, with the total quantity saved, and the average tonnage per acre of prairie grass and of cultivated grasses and clovers respectively; to give the dates of the beginning and ending of harvest, with the average yield per acre in bushels, and comparative quality of each of the respective grains,—wheat, barley, oats, flax and peas; to state generally the quality of the grains and the extent to which they have been injured, if at all; to give the respective average dates at which the following varieties of wheat, viz., Red Fyfe, White Fyfe, White Russian, Golden Drop, and Lost Nation ripened, and the average yield per acre of each; to state generally the condition of field potatoes and roots, and their probable quality, with the probable yield per acre; to state whether the supply of farm-labourers had been equal to the demand or not; to report on native hops growing wild, as to whether they were picked and sold, and with what success, and if hop-growing could be made a paying industry in Manitoba; to name the principal varieties of fruit growing wild, whether they were plentiful or scarce, and what fruits had been cultivated, and the success which attended them; to state whether prairie chicken and wild ducks were as plentiful or more so than last year, and if the law for their protection was generally observed; and to state if hares and rabbits were numerous, and what damage they had done. The foregoing indicate the principal topics on which information was sent to the Department in the latter half of September, and a summary of which appears in Crop Bulletin, No. 9, dated October 31, 1884. Last summer was an unusually backward one in Manitoba and the North-West, but the following figures relating to the ripening and yield of wheat in the Province should, nevertheless, prove interesting:—

VARIETY OF WHEAT.	Average Date of Ripening.	Average Yield in Bushels per Acre.
Red Fyfe	August 28	22·48
White Fyfe	August 29	24·00
White Russian	September 3	25·88
Golden Drop	August 27	23·18
Lost Nation	September 4	25·83

For the entire Province the average date at which cutting began was August 27, and ended September 28, while stacking ended October 3; average yield 22·31 bushels per acre. Percentages of loss, and the causes, were estimated as follows:—rain, ·0146; hail, ·0033; frost, ·0132; rust, ·0001; smut, ·0036; sprouting, ·0063; shrinkage, ·0152. A large percentage of loss

arose from grain being cut in a partially unripe condition, the result of uneven growth and the fear of early frosts. In the eastern districts the loss arose principally from rain, which shelled out much of the grain standing ripe, and caused that which was cut and stacked to sprout. Fears of an occurrence of early frost caused much wheat to be cut in an unripe condition, and consequently a large percentage of loss from shrinkage was observable.

The educational value of these bulletins can hardly be overestimated. In the October issue the farmers of Manitoba are plainly told that, so far as the wheat crop is concerned, they will have to wake up in many respects, and make themselves acquainted with the requirements necessary to render wheat-growing a sure and profitable source of husbandry. The necessity for the autumn ploughing of wheat land is insisted upon. In every case in which wheat was sown as early as practicable in 1884, on land that was prepared in the fall of 1883, the crop was not hurt either by frost or rain. Moreover, the crop had the advantage of the moisture contained in the ground, which served effectually to counteract the drought which prevailed in the latter part of May and the beginning of June. On the other hand, the later-sown part of the crop after spring ploughing, through the effects of a badly-prepared seed-bed and of the drought, came up unevenly at first, and when rain came later on, a second growth started which led to uneven ripening; consequently a portion was prematurely cut, and considerable loss from shrinkage was the result. Farmers are also warned against cultivating more land than they can fairly expect to manage, as seeding of the largest possible acreage does not always imply the most successful farming. The average amount of seed wheat sown per acre in 1884 was 1.8 bushels; but there is a feeling in favour of much thicker seeding, as this would provide against immature seeds, secure the retention of moisture in the soil, prevent the growth of weeds, and promote early maturity. Wheat stools out very freely here and west of Manitoba. On the Bell Farm, and also on the experimental farms of the third prairie plateau, I noticed some extraordinary cases of tillering. Much damage arose from want of care in looking after grain that had been cut and stooked, but not stacked, during the abnormally wet harvest-time. Improper care in stacking likewise led to loss. With printed information of this kind circulating amongst the farmers, the agriculture of Manitoba ought surely to undergo a marked and rapid improvement.

In 1883, the acreage under wheat in Manitoba was 260,842. The yield, based on the returns of the threshers, gave an average

of 21.8 bushels per acre, showing a total yield of 5,686,355 bushels. In 1884 the acreage was increased 18 per cent. viz., to 310,281 acres. Assuming the average yield to be only 20 bushels per acre, which is nearly 2 bushels below the estimated average, the total yield would be 6,205,620 bushels. Deducting from this, 6 bushels per head of the population for consumption and 2 bushels per acre for seeding, the balance for exportation, 4,746,058 bushels, falls less than a million bushels short of the total yield of 1883. These figures convey some idea of the increase in the production of wheat which is taking place in the Province.

As the terms used to denote the qualities of Canadian wheat are now to be frequently seen in English newspapers, it may not be out of place to enumerate here the Manitoba standards for grain as defined by the Chief Grain Inspector of the Province:—

“No. 1, **HARD SPRING WHEAT.**—Shall be Red Fyfe wheat, containing not more than 10 per cent. admixture of softer varieties; must be sound, well cleaned, and weigh not less than 60 lbs. to the measured imperial bushel.

“No. 2, **HARD SPRING WHEAT.**—Shall be Red Fyfe wheat, containing not more than 10 per cent. admixture of softer varieties; must be sound, reasonably clean, and weigh not less than 58 lbs. to the measured imperial bushel.

“No. 1, **SPRING WHEAT.**—Must be sound, well cleaned, and weigh not less than 60 lbs. to the measured imperial bushel.

“No. 2, **SPRING WHEAT.**—Must be sound, reasonably clean, and weigh not less than 58 lbs. to the measured imperial bushel.

“No. 3, **SPRING WHEAT.**—Shall comprise all wheat fit for warehousing, not class enough for No. 2, and weighing not less than 56 lbs. to the measured imperial bushel.

“**REJECTED SPRING WHEAT.**—Shall comprise all wheat fit for warehousing, but too low in weight, or otherwise unfit for No. 3.

“**NOTE A.**—All good wheat which is slightly damp shall be reported ‘no grade,’ with the inspector’s notation as to quality and condition.

“**NOTE B.**—All wheat that is in a heating condition, or too damp to be considered safe for warehousing, or that has any considerable admixture of foreign grain or seeds, or is badly bin-burnt, whatever grade it might otherwise be, shall be reported ‘condemned,’ with inspector’s notation as to quality and condition.

“**NOTE C.**—Wheat containing any admixture of ‘goose wheat’ shall be graded ‘rejected.’

“**NOTE D.**—Wheat containing smut or sprouted kernels, in however slight degree, shall in no case grade in its class as high as No. 1.”

With this classification before them, wheat-growers are encouraged to so clean and prepare their grain that the sample may grade as high as possible, and so command better prices. As the term “goose wheat” in Note C. may prove puzzling to the reader, I may add that this name is given to a very leafy grass-like plant which produces abundance of grain. The grains are highly translucent, and have the appearance of very large, well-

formed, sharp-pointed grains of rye, with a well-defined groove or furrow. But it is too large and shapely for rye. Professor Macoun informs me by letter that it was first cultivated, and is still grown, at Edmonton, on the North Saskatchewan, and that the grain originally sown was obtained from the crop of a wild goose some twelve years ago. He inclines to the opinion that it came from Alaska, or from some Russian settlement across Behring's Strait, and adds that wild geese invariably take to the corn stubbles on their way from the north in autumn. The Edmonton farmers call it "wild goose barley." I have a few grains in my possession and hope to raise some plants, and thus get an opportunity of examining "goose wheat" more closely.

The following figures show the acreage and yield of barley during the last two years in Manitoba:—

	Acreage.	Bushels per Acre.	Total Yield.
1883	60,281	30·00	Bushels. 1,808,430
1884	40,936	32·83	1,343,928

The acreage in 1884 thus shows a falling off of over 31 per cent. as compared with 1883, and the yield is 464,502 bushels less. The reasons assigned are the want of railway facilities in some districts, and the unsatisfactory state of the markets in 1883. The average dates of harvesting barley in the backward season of 1884 were:—cutting began August 26, ended September 11; stacking ended September 28.

Similar information about the oat crop is given in the following table:—

	Acreage.	Bushels per Acre.	Total Yield.
1883	215,431	44·00	Bushels. 9,478,964
1884	128,487	39·67	5,107,079

The falling-off last year is attributed to the unsatisfactory prices which were obtainable for the surplus grain in 1883, and in many cases to the distance from market. Oats sown on spring breaking of the sod were necessarily put in late, and, as a consequence, the crop incurred damage. All information collected last year points to the conclusion that oats, and barley too, must be sown early to be successful, and until this point is strictly attended to satisfactory results cannot be expected.

The quality of the root crop of 1884 was excellent, but turnips suffered early in the season from the attacks of grubs and flies. It is much to be hoped that the enterprising Board of Agriculture of Manitoba will ere long estimate the yield of roots in tons instead of bushels per acre. As it is, I can only give the average yields in bushels per acre, viz., of potatoes, 201; turnips, 392; mangolds, 356; carrots, 223; beets, 275. Turnips are usually estimated at 60 lbs. to the bushel. The respective acreages were: of potatoes, 8847; turnips, 1585; mangolds, 275; carrots, 200; beets, 120—in all cases a falling off as compared with 1883.

Of prairie hay in Manitoba there was cut, in 1884, a total weight of 226,854 tons, the average yield being 1.72 tons per acre. Of cultivated grasses and clovers the total tonnage was 7087, and the average yield 1.25 tons per acre.

The following averages relate to peas and flax in 1884:—

	Harvest Began.	Ended.	Yield in Bushels per Acre.
Peas	August 25	September 14	22
Flax	September 7	September 22	16

Native hops grow wild in every county of the Province, and are the only variety used by settlers. I saw some excellent samples at the Manitoba Exhibition, held at Winnipeg, in September, 1884. The general opinion is that the cultivation of hops might be made successful so far as yield and quality are concerned, but the questions of a market and the cost of labour have yet to be considered. The native variety is of such excellent quality that it is thought its improvement by cultivation would probably be attended with more success than the introduction of ordinary cultivated varieties from Ontario or elsewhere. It is feared that the high winds which frequently prevail on the prairies might interfere with the cultivation, and the open prairie would certainly not be suitable for hop fields, properly sheltered grounds being absolutely necessary.

Though Manitoba abounds in wild fruits, the cultivation of fruit is nevertheless receiving increasing attention. The wild varieties comprise strawberries, black and red raspberries, black and red currants, high and low bush cranberries, saskatoon berries, gooseberries, red and black cherries, red plums, blueberries, whortleberries, juneberries, grapes, and hazel nuts. Of these, only the saskatoon berries will appear

unfamiliar to the English reader; they are the fruit of certain rosaceous plants, *Amelanchier alnifolia* and *A. Canadensis* var. *oblongifolia*, allied to the medlar, the apple, and the pear. The cultivated fruits are chiefly currants, gooseberries, strawberries, raspberries, plums, apples, and crab-apples; those most extensively and most successfully grown being currants, gooseberries, and strawberries. Apples have not succeeded very well, owing, doubtless, to the fact that the trees have generally been selected from more southern latitudes. Standards are, therefore, now being imported from Russia; and it is expected that these will yield better results. Raspberries, though less widely cultivated than gooseberries and strawberries, have given encouraging results. Plums, grapes, and crab-apples are not at present so widely spread, nor so successfully grown.

The law as to the destruction of noxious weeds is reported as being carefully carried out. Wild buckwheat seems to be very prevalent; this plant is, I believe, identical with the black bindweed, *Polygonum Convolvulus*, of English cornfields. Lamb's quarter, similar to our dock, and wild sunflower are also troublesome; while corn cockle, mustard, wild oats, and Canada thistles abound, and would speedily become an oppressive evil but for the steps taken for their continual suppression.

Stock-raising, in connection with grain-growing, is steadily increasing, though want of railway communication and of suitable markets act as a check in some districts of the Province. Horse-breeding has made a fair start, and a large number of foals were dropped last spring. Besides native horses there were returned, as in the Province last summer, 13,493 horses, in addition to 168 stallions, and they are classified under the following heads:—French Canadian, Clydesdale, Coach, Mixed, Heavy Draught, Percheron, Blood, Roadster, General Purposes. Cattle-raising is greatly on the increase, and, excluding native cattle, there were in the Province last summer 45,810 head of cattle, which are arranged under the three sections of Durhams, Ayrshires, and Grades, the greater proportion belonging to the last-named group. Grade cattle are the old-established or native stock improved by crossing with English breeds, and are usually styled "Shorthorn grade," "Hereford grade," &c., as the case may be, while "high grade" or "low grade" refers to the extent to which they have been improved. Two or three crosses of English blood would probably produce high grade stock, while the first cross would usually be low grade.

Dairy-farming is practised as far as the means of the farmers will allow. The supply of locally made butter is far in excess of the consumption in most of the townships. Very little cheese is made beyond that required for household use, although nearly all farmers appear to make it.

The number of sheep in Manitoba on July 1, 1884, was reported as 3617, distributed amongst the Merino, Leicester, Cotswold, and Southdown breeds. The number, though small, is proportional to the local consumption and to the demand for wool. It is a lack of market facilities which causes sheep-raising to be in such a backward condition. The correspondents of the Board of Agriculture are unanimous in their opinion that sheep-farming could be made to pay, and it is claimed that the extensive pastures of good grass, the rich dry soil and dry air, the temperate summer climate, and the absence of rain or sleet storms in the winter, would all favour the breeding and maintenance of ovine stock. Assuming that the prairies in their wild state are capable of maintaining three sheep per acre, and an equal or larger number after seeding with cultivated grasses, a great prospect is opened up for the near future, and an extension of sheep-farming would carry with it the advancement of agriculture, involving the best means of cultivation for raising large quantities of cheap roots and green crops. One drawback is suggested by the difficulty of keeping sheep fenced in and confined to their respective farms, as wire fencing, the kind most generally in use, is very detrimental to the wool. But appropriate branding of the fleeces and the use of sheep-dogs would go a long way to remove this difficulty, which certainly looks less formidable than that of the winter management of the flocks, for, with a foot or more of snow on the ground, housing of some kind would appear to be necessary.

On July 1, 1884, the number of pigs in Manitoba was returned as 32,701, arranged under the heads of Berkshire, Suffolk, Yorkshire, Chester, and Poland China. The number of thoroughbreds is rather limited as yet. Every farmer, as far as possible, keeps enough pigs for his own use, but in several districts very little pork is raised beyond the requirements of home consumption. As railway and market facilities increase, pig-breeding will no doubt become more prevalent, and it is even hoped to make Winnipeg such a centre of the pork industry as Chicago, a thousand miles to the south-east, has become.

Poultry is very generally kept in Manitoba, and with every success. Fowls are, as might be expected, the most numerous, and are in many instances kept in very large flocks; turkeys, geese, and ducks are also profitably maintained. Special means are necessary for housing in the winter, either underground houses or cattle-sheds being used, and no losses are reported from the severe winter weather. Minks, foxes, weasels, and skunks often attack and sometimes destroy large numbers of fowls. The cheapness of bird food in the Province and the demand for eggs are other inducements to poultry raising.

Live-stock throughout the Province appears to be almost free from disease, and, with the exception of some isolated cases of glanders among horses, nothing was reported last summer. In the preceding winter cattle were in a few places troubled with a swelling on the jaws, which, however, disappeared with the appearance of spring. Many sows and litters were lost, owing apparently to over-feeding before farrowing, the abundance of inferior wheat on hand having been supplied to the sows not wisely but too well. Mr. Acton Burrows very significantly remarks, "the country possesses many young and inexperienced farmers who will have to make their calling a study in every respect if they expect to get on and prosper."

The total number of farmers in Manitoba last summer was 6815, and the average number of acres occupied by each was 279.

The condition of the labour market in Manitoba last July may be briefly stated. There was a good demand for labourers in many localities, particularly in the older counties. In many places help was needed from the beginning of spring work till the ending of fall-ploughing and fall-threshing, the greatest demand being during hay-making and harvesting. In a few cases help was required during the entire year, but in the more newly settled townships, where farmers are few, work is exchanged, and in this way, assisted by such implements as may be available, the harvest operations are got through without hired help. The wages paid to farm hands per month, with board, vary from 3*l.* 12*s.* to 6*l.*, the average being 4*l.* 18*s.* It is very difficult to obtain female servants on farms, their apparent desire being to get into the cities and larger towns; wages vary from 1*l.* 14*s.* to 4*l.* per month, the average being 2*l.* 4*s.*

The distribution of timber in Manitoba is very irregular. While a great many townships possess none, others have supplies capable of lasting from one or two to fifty years, and in some cases for all time, if protected from fires. Wire fencing being so generally used, comparatively little timber is required for this purpose. In several instances wood has to be drawn long distances, and in some cases the supply of wood for fuel is becoming a serious question; but, so far as Southern Manitoba is concerned, the difficulty will cease when the South-Western Branch of the Canadian Pacific Railway is extended to the Souris Coalfields. The following are the most abundant varieties of wood, named in the order of their frequency of occurrence, those that are most generally distributed being named first:—poplar, oak, ash, elm, balsam of Gilead fir, maple, birch, willow, spruce, tamarac (the American larch), cherry, basswood (the American lime-tree), pine, hazel, plum, thorn, and ironwood.

The reason I have confined myself to the two years 1883 and 1884 in this brief survey of the agriculture of Manitoba is that official figures for previous years were not recorded. In fact it was not till 1882 that railway facilities rendered immigration into the Province possible on a large scale, and the organisation of the Manitoba Department of Agriculture was not commenced till the June of that year, and the first report issued by the Department bears date, March 31, 1883. But as a country covering an area greater than that of the British Isles, and possessing a soil whose wheat-growing capabilities are of world-wide fame, is far too important to be ignored by English agriculturists, it seems desirable not to omit any essential details in the history of this remarkable Province. The Department, by various means which need not be detailed, secured records of the average yields of the various crops for each of the years 1876 to 1882 inclusive, and they are embodied in bushels per acre in the following table:—

	1876.	1877.	1878.	1879.	1880.	1881.	1882.	General Average.
Wheat	32	27	26	27	29	30	32	29
Barley	42	41	36	38	41	40	37	39
Oats	51	60	60	58	58	59	51	57
Peas	32	32	34	32	38	38	..	34
Potatoes	229	304	308	302	318	320	278	294
Rye .. ..	..	30	30	40	40	35	..	35

Commenting on the yield of wheat in 1882, the first annual Report contains the following observations:—

“The harvest of 1882 has added another link to the long chain of evidence which proves Manitoba to be the premier wheat district of the world. The practical results of the threshing, giving an average yield per acre of 32 bushels, have shown that the theories previously advanced were founded on fact. Nor could it well have been otherwise, for climatologists have long since satisfactorily demonstrated that the cultivated plants yield the greatest product near the northernmost limit of their growth. Hence the perfection of wheat here, where, instead of being developed too rapidly, as is the case farther south, the undue luxuriance of the stem or leaf is restrained by the cool late spring, and the chief development of the plant thrown into the ripening period. The assertion of the distinguished American climatologist, Blodgett, ‘that the basin of the Winnipeg is the seat of the greatest average wheat product on this continent, and probably in the world,’ has been proved correct by the record of a yearly average of over 29 bushels per acre from 1876 to 1882. In Ontario, the 1882 spring-wheat crop yielded but 16·5 bushels per acre, while the three great wheat States of the American Union yielded as follows: Dakota, 16·7 bushels; Minnesota, 13·3 bushels; Iowa, 11 bushels. Minnesota is the empire wheat State of the Union. Its averages for 12 years were: 1869, 17·70 bushels per acre; 1870, 15·07; 1871, 12·28; 1872, 17·40;

1873, 17.01; 1874, 14.23; 1875, 17.05; 1876, 9.61; 1877, 16.78; 1878, 12.50; 1879, 11.30; 1880, 13.30. A yearly average of 14.51 bushels.

"The report of the Ontario Agricultural Commission, whose investigations embraced the results of years, places, the general average of the Province at 11.5. In the 10 years, from 1870 to 1879, the yearly average per acre over the whole area of the United States was but 12.3. South Australia, during 9 years, averaged but 8 bushels. In Great Britain and Ireland, with high cultivation, fall wheat yielded from 1852 to 1879 an annual average per acre of 27½ bushels of 61 lbs. per bushel, equal to 28⅓ bushels of 60 lbs."

Though it appears that autumn sown wheat may succeed in sheltered places, it is spring wheat which best suits the Province; for it is claimed that not only is its average yield per acre ahead of that of any other country, but its weight per bushel is also greater, and its flour-producing qualities are unequalled. The St. Paul 'Pioneer Press,' the leading journal of the great wheat State of Minnesota, which adjoins Manitoba on the south, wrote:—

"It seems to be a settled fact that the farther north wheat is grown, up to a certain limit, the better it is. The berry obtains an amber colour, rounds out into a fullness it does not attain here, and is rich in gluten, the life-sustaining principle of flour. Some two or three years ago samples were procured from several parts of the Province of Manitoba for trial. (The best of this was placed in the hands of some of our leading wheat-growers for cultivation. One variety of Red Fyfe yielded the first year at the rate of 37 bushels to the acre, of a hard amber colour, which the wheat inspector for the Millers' Association at Minneapolis pronounced the finest specimen he had seen since he had been connected with the Association."

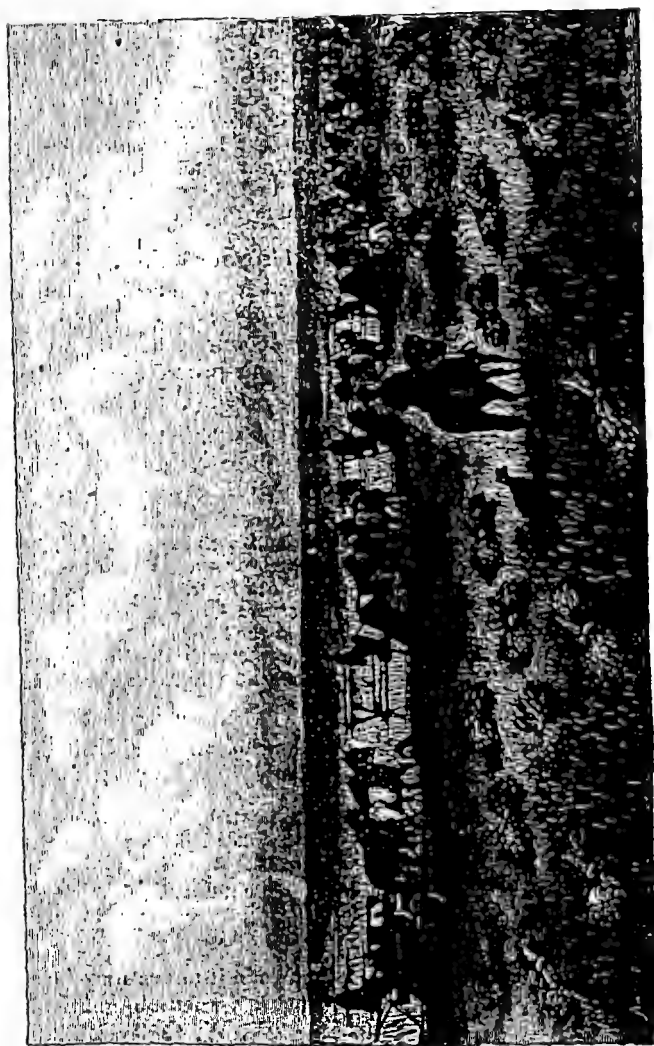
Nor less outspoken is the opinion of another United States journal, the 'American Miller':—

"It is quite generally conceded that the best wheat-fields in the world for the production of the hard wheats so much desired in gradual reduction milling, lie partly in Minnesota and Dakota, but chiefly in Manitoba. The possible acreage of Manitoba wheat is only bounded by its settlement, and we must expect a constantly-increasing crop in that part of the Dominion for many years to come."

The testimony from these American sources may be appropriately supplemented by that of a Canadian gentleman of extensive business experience, Mr. W. W. Ogilvie, managing partner of the Ogilvie Milling Company:—

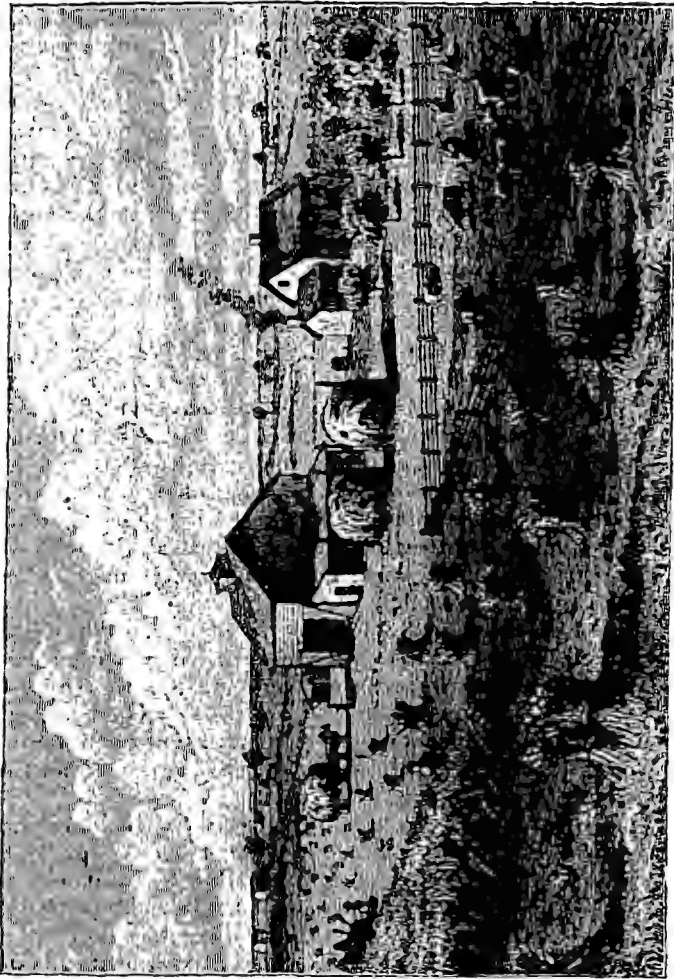
"We like Manitoba wheat because it contains more gluten than any other. This is the quality that is required to make a light loaf of bread. It is altogether in the soil, which is new, dark and deep; it has a greater depth of dark soil than any part of the United States. . . . You will get 12 lbs. more and much better bread from 100 lbs. of Manitoba wheat-flour than from Ontario wheat-flour. It will also give 2 to 3 lbs. more flour per bushel than Ontario wheat. The wheat of Ontario is every year getting weaker, and containing more starch and less gluten, so that this year (1882) we find it impossible to make good flour out of it. The element required for growing

Fig. 2.—Harvesting on the Prairie.



good wheat has passed out of the land, and no manuring will restore it. You may be able to grow a good yield of good-looking wheat, but it will not have gluten enough to make good bread. The same thing exists in the middle and eastern States. The sooner Ontario, like New York State, gives up growing wheat, and turns to dairy and cattle, the better. I have travelled over the wheat-fields of Europe, Asia, and Africa, and know very well all the wheat-lands of the United States except California, but I have never seen wheat-lands equal to Manitoba and the North-West Territory."

The wheat most suitable for Manitoba is Red Fyfe, and

Fig. 3.—*Prairie Farm after Three Years.*

any one who examines a sample of this grain cannot fail to notice the sub-translucent appearance it possesses, similar to that of the Ghirka wheat grown on the Russian steppes, and shipped at the Black Sea ports. Notwithstanding the prevalent idea that Red Fyfe originated in Scotland, and derived its name from the County of Fife, Mr. Sheriff Ferguson, of Kingston, Ont., the first President of the Agriculture and Arts Association of Ontario, gives another and probably correct account of its origin. A family, named Fyfe, residing near Kingston, Ont., left there in 1837, and settled between Port Hope and Cobourg,

and while there received a letter from a friend in Scotland, containing a few grains of Ghirka wheat taken from a vessel that had arrived from the Black Sea, and was discharging her cargo at Glasgow. They sowed the grains, and kept on cultivating year by year, till they obtained a sufficient quantity to carry off the first prize for spring wheat at the Provincial Exhibition at Cobourg. The grain was improved by its cultivation in Ontario, and has still further advanced in quality in its nearer approach to the northern limits of cultivation in Manitoba. This incident is further of interest in showing the value of the Provincial Exhibition as a stimulus to improvement.

The average yield of barley in Manitoba from 1876 to 1882, both inclusive, was 39 bushels per acre. The report of the Ontario Agricultural Commission places the yearly average of that Province at 25 bushels. In the decade from 1870 to 1879 the yearly average in the United States was 21·9. During the last two years the yield of barley in Manitoba—30 bushels and 33 bushels respectively—shows a falling off as compared with the average of the preceding seven years, but this may really be accounted for in part, perhaps, by the greater care with which the estimates are now made, and the more thorough collection of statistical information.

Similar remarks apply to the yield of oats. For the seven years, 1876 to 1882, the average is reported at 57 bushels per acre, whereas for the last two years the numbers have been 44 bushels and 40 bushels respectively. The Ontario Agricultural Commission reports the yearly average of that Province at 33½ bushels. In the United States the average yield for the ten years, 1870 to 1879, was 28·3 bushels.

Indian corn has been but little cultivated in Manitoba, the comparative shortness of the season and the cold spring being unfavourable to its mature growth. But when it was urged against the Province that maize could not be successfully grown, the Board of Agriculture retorted that there was no reason why it should be grown, that wheat-raising pays better, and that corn is only cultivated to-day in many of the western States of the Union because of their inability to raise wheat. This, indeed, was frankly admitted at the convention of agriculturists held at Washington, D.C., in January, 1882, under the Presidency of the United States Commissioner of Agriculture, when Mr. Blount, of Colorado, in speaking of the improvement of the cereals, said of the wheat crop of the West :—

“Wheat is full of eccentricities, made up of whims and freaks. In some sections it promises one day to make the farmer a millionaire; the next these promises are all blasted by blasted heads and rusty blades. In money value wheat is king. Every man can raise corn, but every man cannot raise wheat.”

The extension of railway communication on the prairie will not only greatly facilitate the means of transport, but will have the effect of developing new centres of industry. A case in point is afforded by Minnedosa, which lies to the north-west of Winnipeg, on the Little Saskatchewan River. It is now reached by the Manitoba and North-Western Railway, and I am informed by the Hon. Wm. Nelson Hood, who is well acquainted with the locality, that the land around Minnedosa is of the most fertile character, and that when its splendid water-power becomes fully utilised, this rising young city is not unlikely to grow up a second Minneapolis.

THE NORTH-WEST.

When the traveller leaves Winnipeg for the west by the Canadian Pacific Railway he notices that the line strikes out across the open prairie, and for a distance of five-and-twenty miles beyond the race-course there are no indications of cultivation; this is due to the land being held by speculators who are waiting for the "rise" which shall enable them to "clear out." "The country has only one pest worse than mosquitos, the speculators, called in vivid Western parlance 'boomsters,' who fortunately have, for the moment, burst themselves in a vain attempt to drink up the whole North-West!"* The traveller journeys on through the flourishing young towns of Portage la Prairie and Brandon; and after a run of some two hundred miles he, on the second prairie plateau, leaves the province of Manitoba, and enters the great North-West. Recent as has been the settlement of the majority of the inhabitants of Manitoba, that of most of the dwellers in the North-West is still more so. Indeed, it was not till the beginning of 1882 that the track of the Canadian Pacific Railway emerged from Manitoba into the vast territory beyond, and it was in the same year that this portion of the North-West was, for purposes of government, separated into four provisional districts, namely—

Assiniboia	..	..	..	95,000	square miles
Alberta	..	..	..	100,000	" "
Saskatchewan	..	..	..	114,000	" "
Athabasca	..	..	..	122,000	" "

Of these, Athabasca is greater, and each of the others less than the entire area of the British Isles. Regina is the capital and the seat of government of the North-West territories, and also the head-quarters of the North-Western Mounted Police, who are the guardians of the peace on the prairie; it is in Assini-

* 'Handbook for the Dominion of Canada,' p. 332.

boia, the other important towns being Moosomin, Broadview, Qu'Appelle, Moose Jaw, and Medicine Hat. Here it should be mentioned that Bishop Anson's Farm for the instruction of intending colonists in the agriculture of the Province is at Qu'Appelle. After leaving Manitoba, the railway traverses the length of Assiniboia for a distance of nearly 500 miles, and then enters the district of Alberta, which is bounded on the south by the United States, on the north by the district of Athabasca, on the west by the Rocky Mountains, and on the east by the districts of Assiniboia and Saskatchewan, the latter lying to the north of the former. Passing in a north-westerly direction out of Alberta, the Canadian Pacific Railway enters the Pacific Province of British Columbia, and almost immediately attains its summit level of 5300 feet above the sea in the beautiful Kicking Horse Pass of the Rocky Mountains, at a point 960 miles from Winnipeg. Had the line continued its westerly course, instead of trending to the north-west, it would have passed through the heart of the ranching country which extends southward from Calgary. The chief towns in the district of Alberta are Calgary, Fort McLeod, and Edmonton. In Saskatchewan the leading centres are Battleford and Prince Albert. It is not within the scope of this paper to enter into further details of this nature, but I have elsewhere given a fuller account of the young cities of the prairie.*

In seeking to obtain information as to the agricultural features of the great North-West, the inquirer experiences considerable difficulty, for, vast as this territory is, it possesses as yet no history, and such official records as do exist are meagre and insufficient. Originally the whole area was under the jurisdiction of the Hudson's Bay Company, and it is only within the last two years that there has been any influx of population from beyond its borders. But though Captain Butler, in his well-known book, correctly calls it "the great lone land," it is destined to remain lone no longer, for the irruption into its area of the well-laid track of the Canadian Pacific Railway has placed it within easy reach of settlers from the East, who will invade its solitudes, and cultivate the wilderness which was till so recently the home of the countless herds of buffalo which have now well-nigh disappeared. And yet it is twenty years since Viscount Milton and Dr. Cheadle advocated—

"the opening out and colonisation of the magnificent regions of the Red River and Saskatchewan, where 65,000 square miles of a country of unsurpassed fertility, and abounding in mineral wealth, lies isolated from the world, neglected, almost unknown, although destined, at no distant period

* 'Across Canada: A Report on Canada and its Agricultural Resources,' obtainable at the office of the High Commissioner for Canada, 9, Victoria Chambers, London, S.W.

perhaps, to become one of the most valuable possessions of the British Crown."

The meteorological records of the North-West are necessarily very scanty, and the only figures I am able to quote are those indicating the temperature at Edmonton, in Alberta, on the North Saskatchewan River, during the months of 1882, the following table being abridged from the 'Twelfth Annual Report of the Meteorological Service of the Dominion of Canada,' which was published last year. I have also added in a parallel column the monthly mean temperatures in the same year at Humboldt, a station in Saskatchewan, considerably to the east of Edmonton:—

	Temperature at Edmonton, 1882. Degrees Fahrenheit.			At Humboldt, 1882. Degrees Fahrenheit.
	Mean Maximum.	Mean Minimum.	Mean.	Mean.
January	17·77	—4·28	6·74	—2·58
February	25·12	—3·66	10·73	6·96
March	24·54	1·08	12·81	7·90
April .. .. .	..	..	..	28·93
May	62·45	37·06	49·75	46·84
June	69·37	47·04	58·20	56·47
July	72·00	49·51	60·75	60·61
August	73·35	48·33	60·84	63·16
September	62·26	35·70	48·98	49·23
October	42·15	27·41	34·78	34·47
November	30·49	10·23	20·36	16·97
December	19·08	—2·00	8·54	5·03

The highest temperature recorded during the year 1882 at Edmonton was on August 8, 9, and 10, on each of which days the thermometer rose to 87°. The lowest temperature (—52°) was touched on February 16. The thermometer did not fall to freezing-point between May 22 and September 16, and only on one occasion (June 21, 39°) did it sink below 40° between May 25 and September 5. Hence there is a short, but rapid season of vegetation during the summer months; and, speaking of Edmonton, Viscount Milton and Dr. Cheadle observe, "wheat grows luxuriantly, and potatoes and other roots flourish as wonderfully here as everywhere else on the Saskatchewan." In describing their journey along the banks of the North Saskatchewan towards Fort Pitt during the second week of April, 1863, they say—

"The weather was beautifully bright and fine, and the snow had almost gone. Flocks of ducks and geese passed continually, and the whistling of their wings, as they flew overhead on their way northwards, went on incessantly all night, almost preventing sleep. The country we passed through

was of the usual rich character—mingled woods, rolling prairies, and lakes and streams—except for one day's journey, when we crossed a bleak and barren tract. This was a level plain, backed by an amphitheatre of bare, rugged hills. But beyond this, at a place called the Source, from a river which springs out of the ground there, the country resumed its former character.”*

Nor are these intrepid travellers less enthusiastic in their description of the regions they penetrated after leaving Fort Pitt and moving westward towards Edmonton :—

“We now entered a most glorious country—not indeed grandly picturesque, but rich and beautiful : a country of rolling hills and fertile valleys, of lakes and streams, groves of birch and aspen, and miniature prairies ; a land of a kindly soil, and full of promise to the settler to come in future years, when an enlightened policy shall open out the wealth now uncared-for or unknown.”†

The system of survey adopted in the North-West Territories, and carried out by the Dominion Land Surveyors, is very complete, and so simple that a few letters, and figures serve to indicate any given area without the least risk of ambiguity.

“The entire country is laid off in townships 6 miles square, containing 36 sections of 640 acres each, which are again subdivided into quarter sections of 160 acres. A road allowance, having a width of 1 chain, is provided for on each section-line running north and south, and on every alternate section-line running east and west. The following diagram shows a township with the sections numbered :—

	N						
	31	32	33	34	35	36	
	30	29	28	27	26	25	
	19	20	21	22	23	24	
W	18	17	16	15	14	13	E
	7	8	9	10	11	12	
	6	5	4	3	2	1	
	S						

* ‘The North-West Passage by Land,’ p. 172.

† *Ibid.* p. 178.

"The sections are appointed as follows :—

"OPEN FOR HOMESTEAD AND PRE-EMPTIONS.—Nos. 2, 4, 6, 10, 12, 14, 16, 18, 20, 22, 24, 28, 30, 32, 34, 36.

"CANADIAN PACIFIC RAILWAY SECTIONS.—Nos. 1, 3, 5, 7, 9, 13, 15, 17, 19, 21, 23, 25, 27, 31, 33, 35.

"Nos. 1, 9, 13, 21, 25, 33 along the main line, Winnipeg to Moose Jaw, sold to Canada North-West Land Company, the balance of their lands being in Southern Manitoba.

"SCHOOL SECTIONS.—Nos. 11, 29 (reserved by Government solely for school purposes).

"HUDSON'S BAY SECTION.—Nos. 8 and 26."

In the above diagram each little square represents an area of one square mile, and it must be apparent from the details just given that it is impossible for one purchaser to secure a very large uninterrupted tract of land.

To encourage and promote the construction of railways, the Dominion Government have granted certain concessions of land to the railway companies, so that both the latter and the Government are in a position to offer lands to intending settlers. The Manitoba and North-Western Railway Company, at present engaged in laying a line from Portage la Prairie, in Manitoba, to Prince Albert on the North Saskatchewan, have a land grant of 2,750,000 acres, out of which they had at the beginning of 1884 acquired a right to sell 512,000 acres. The Company sell land warrants, entitling the purchaser to one or more quarter sections of 160 acres each, to be selected by himself from any of the Company's unsold land.

The Government grant to the Canadian Pacific Railway comprises, in addition to other concessions, the lands lying within a belt twenty-four miles wide on each side of the line in Manitoba and the North-West. These lands are offered for sale, at prices ranging from 10s. per acre upwards, with conditions requiring cultivation, or at lesser figures without conditions. To encourage cultivation the Company stipulate that :—

"A rebate of from 5s. to 14s. sterling per acre, according to the price paid for the land, will be allowed on the acreage actually cropped, on the following conditions:

"1. The purchaser will not be entitled to rebate unless at time of purchase he enters into an undertaking to cultivate the land.

"2. One-half of the land contracted for to be brought under cultivation within four years from date of contract. In cases where purchasers do not reside continuously on the land, at least one-eighth of the whole quantity purchased shall be cultivated during each of the four years.

"3. Where a purchaser fails to carry out fully the conditions as to cultivation within the time named, he will be required to pay the full purchase price on all the land contracted for. But if from causes beyond his control, proved to the satisfaction of the Company, a settler so fails, he may be allowed the rebate on the land actually cultivated during the four years, on payment of the balance due, including the full purchase price of the remainder of the land contracted for.

"All sales are subject to the following general conditions:—

"1. All improvements placed upon land purchased to be maintained thereon until final payment has been made.

"2. All taxes and assessments lawfully imposed upon the land or improvements to be paid by the purchaser.

"3. The Company reserves from sale, under these regulations, all mineral and coal lands; and lands containing timber in quantities, stone, slate and marble quarries, lands with water-power thereon, and tracts for town sites and railway purposes.

"4. Mineral, coal and timber lands and quarries, and lands controlling water-power, will be disposed of on very moderate terms to persons giving satisfactory evidence of their intention and ability to utilise the same.

"5. The Company reserves the right to take without remuneration (except for the value of buildings and improvements on the required portion of land) a strip or strips of land 200 feet wide, to be used for right of way, or other railway purposes, wherever the line of the Canadian Pacific Railway, or any branch thereof, is or shall be located."

On its own lands the Government offers 160 acres (a quarter section, that is) free to each settler, with the privilege of pre-empting another 160 acres, the conditions being stated as follows:—

"Under the Dominion Lands Regulations, all surveyed even-numbered sections, excepting 8 and 26 in Manitoba and the North-West Territories, which have not been homesteaded, reserved to provide wood lots for settlers, or otherwise disposed of or reserved, are to be held exclusively for homesteads and pre-emptions.

"Homesteads may be obtained upon payment of an office fee of 2*l.*, subject to the following conditions as to residence and cultivation.

"In the 'Mile Belt Reserve,' that is, the even-numbered sections lying within one mile of the main line or branches of the Canadian Pacific Railway, and which are not set apart for town sites or reserves made in connection with town sites, railway stations, mounted police posts, mining and other special purposes, the homesteader shall begin actual residence upon his homestead within six months from the date of entry, and shall reside upon and make the land his home for at least six months out of every twelve months for three years from the date of entry; and shall within the first year after the date of his homestead entry, break and prepare for crop 10 acres of his homestead quarter section; and shall within the second year crop the said 10 acres, and break and prepare for crop 15 acres additional—making 25 acres; and within the third year after the date of his homestead entry, he shall crop the said 25 acres, and break and prepare for crop 15 acres additional—so that within three years of the date of his homestead entry he shall have not less than 25 acres cropped, and 15 acres additional broken and prepared for crop.

"Land, other than that included in Mile Belt, Town Site Reserves, and Coal and Mineral Districts, may be homesteaded in either of the two following methods:—

"1. The homesteader shall begin actual residence on his homestead and cultivation of a reasonable portion thereof within six months from date of entry, unless entry shall have been made on or after the 1st day of September, in which case residence need not commence until the 1st day of June following, and continue to live upon and cultivate the land for at least six months out of every twelve months for three years from date of homestead entry.

"2. The homesteader shall begin actual residence, as above, within a radius

of two miles of his homestead, and continue to make his home within such radius for at least six months out of every twelve months for the three years next succeeding the date of homestead entry; and shall within the first year from date of entry break and prepare for crop 10 acres of his homestead quarter section; and shall within the second year crop the said 10 acres, and break and prepare for crop 15 acres additional—making 25 acres; and within the third year after the date of his homestead entry he shall crop the said 25 acres, and break and prepare for crop 15 acres additional, so that within three years of the date of his homestead entry he shall have not less than 25 acres cropped; and shall have erected on the land a habitable house in which he shall have lived during the three months next preceding his application for homestead patent.

"In the event of a homesteader desiring to secure his patent within a shorter period than the three years provided by law, he will be permitted to purchase his homestead on furnishing proof that he has resided on the land for at least twelve months subsequent to date of homestead entry, and, in case entry was made after the 25th day of May, 1883, has cultivated 30 acres thereof.

"In the case of a homesteader being entitled to receive his homestead patent for land occupied by him for the full period of three years, he will, on production of a certificate to that effect from the Commissioner of Dominion Lands, be permitted to make a second entry.

"Any homesteader may at the same time as he makes his homestead entry, but not at a later date, should there be available land adjoining the homestead, enter an additional quarter section of and as a pre-emption on payment of an office fee of 2*l*.

"The pre-emption right entitles the homesteader, who obtains entry for a pre-emption, to purchase the land so pre-empted on becoming entitled to his homestead patent; but should the homesteader fail to fulfil the homestead conditions he forfeits all claim to his pre-emption.

"The price of pre-emptions, not included in Town Site Reserves, is 10*s*. an acre. Where land is north of the northerly limit of the land grant, along the main line of the Canadian Pacific Railway, and is not within 24 miles of any branch of that railway, or 12 miles of any other railway, pre-emptions may be obtained for 8*s*. per acre.

For reasons already stated it is impossible at present to give any figures representing the acreage under cropping, or conveying accurate information as to the average yields, in the districts of the North-West. Towards the close of last year, however, the Canadian Pacific Railway authorities sent out a large batch of queries to settlers in Manitoba and the North-West, with the intention of publishing the replies received, and, through the kindness of Mr. Alexander Begg, Canadian Pacific Railway, 88, Cannon Street, London, E.C., I have been favoured with an advance copy of this publication, and propose to make use of some of the facts contained therein, which I have less hesitation in doing, inasmuch as I am quite satisfied as to the *bonâ fide* character of these replies, and I do not think they would have been any different had I sent out the questions myself.

Most of the settlers in the North-West are poor, and a great many are forced to commence their operations with oxen only, being at first unable to afford horses. The tillage work of the

prairie is of a simple character, and as the sulky plough is so constructed as to seat the driver, even the ordinary skill of the ploughman is not a necessity. The first field operation is that of "breaking"; the top soil is turned over to a depth of from two to three inches, and in a slice varying from a foot to sixteen inches broad,—May, June, and July being the best months for this work. "Back-setting" follows in August and September, and consists in ploughing between the slices and turning the original surface to the top again, or, in some cases, wedging it up. Then, in April or May, after the long frost of winter has crumbled the soil and produced a good tilth, the land is ready for seeding and harrowing. Sometimes sowing "on the sod" is resorted to in spring, as in the case of oats, for example; the seed is sown on the surface of the prairie, which is then subjected to breaking, a sod a couple of inches thick being turned over.

It will not be thought that the soil all over the North-West is the same in character as the rich loam of the Red River valley, which extends through Manitoba; what has already been said as to the geological features of the great prairie region will show that there may be considerable variation. Each correspondent was requested by the railway authorities to state the nature of the soil on his farm and the depth of black loam. At Moose Jaw, the soil is reported various, but all good, with 6 in. to 12 in. of loam; at Regina, a black clay loam of unknown depth; at Moosomin, black loam, from 8 in. to 22 in. deep, with sand or clay sub-soil. Further information of this character is given later on in the description of the C. P. R. Experimental Farms.

Fuel, abundant in some localities, is very scarce in others, but the opening up of coal and lignite deposits in the North-West, and the increasing facilities for railway transport, will gradually place the settlers more on an equality in this respect. Wood is chiefly used, though that has sometimes to be drawn long distances. Water is obtained mostly from wells, sometimes from creeks, and in rare cases has to be drawn some distance.

The yields per acre for wheat vary between 25 and 40 bushels, the most usual estimate being 30. Barley ranges from 25 to 50 bushels, 40 being the most common estimate. Oats yield from 35 to 75 bushels, the usual quantity being about 50. Inferior yields are attributed by the farmers themselves to bad tillage or absence of back-setting. Garden vegetables, and particularly potatoes, are favourably reported. For potato cultivation the method is to plough and backset, and to harrow in the following spring, after which the seed tubers are laid in furrows made by the plough, which is then sent between the furrows to cover them up. This is done in May.

Stock are scarce, "67 cattle and 3 horses," and "30 horses and 20 head of cattle," being the largest returns from individual farmers. At Moose Jaw cattle do excellently on the prairie hay. They are stabled in winter if the weather is very bad, but are out most days. At Wolseley cattle fatten well on prairie hay alone, which was there cut 66 inches long last summer. The general opinion is decidedly favourable to the maintenance of sheep, though there is at present a drawback in the want of a market for the wool. At Ossowa, sheep realise from 6d. to 7d. per lb. in carcass. At Griswold sheep do exceedingly well; they run the prairie in summer, and are under shed in winter.

Eighty-four farmers expressed themselves as satisfied with the country, the climate, and their prospects; but some say more railways are necessary. Some want the Hudson Bay Railway to be made, and ask for free-trade in lumber and machinery, the duty of 33 per cent. on farm implements from the States being objectionable. Notwithstanding this tariff, the American machinery seems to hold its place against that made in Canada; quite half the implements on the Bell Farm are of American manufacture.

Asked whether they had suffered any serious loss from storms during either summer or winter, 154 farmers replied briefly in the negative. Of the 60 remaining answers one-third were adverse: hail, heavy rains, or frost causing the mischief, though the injury from frost is sometimes acknowledged to be due to late sowing. The autumn frosts on the prairie appear to be somewhat peculiar:—

"Frosts are common there in the nights of September, but the fact has been noted by many independent observers that frost which would injure grain in many other countries appears to be innocuous on the Red River and the Saskatchewan. Various reasons have been assigned—such as the dryness of the atmosphere, the heat-retaining character of the soil, and the sudden change of temperature that enables vigorous plants to bear an atmosphere at 20° better than at 35°, when the latent heat of the earth and the plants has been given off. But whatever be the true cause, the fact appears to be well attested. The chief lesson which experience has taught the farmer is to sow his wheat early in the spring, so that the ear shall be past the milky stage before the frost comes."

Notwithstanding the long and severe winter the reports as to the climate nearly all concur in representing it as not only tolerable, but bracing and healthy, and people who have gone to the prairie in indifferent health have found the change beneficial. An old Scotchwoman wrote home, "It is fine to see the bairns play in the snow without getting their feet wet."

The settlers appear, in the great majority of cases, to have

commenced with less than 200*l.* capital, frequently with less than 100*l.*, and sometimes with none. On the other hand, cases are recorded in which the initial capital ranged to as high as 2000*l.* The eighty or ninety farmers who furnish information under this head report their financial position as improved, and in some cases very markedly so.

Hitherto the North-West has derived the greater proportion of its settlers from the eastern provinces of the Dominion, chiefly Ontario. The arrivals from Europe have been almost entirely from the British Isles, but the country has not been opened up long enough to allow of any marked influx of population from the other side of the Atlantic. That has yet to come.

As the railway systems are extended in the North-West the old-fashioned bullock freight-trains will disappear. These, consisting of some dozen waggons lashed together in pairs, with sixteen or eighteen bullocks attached to each, were the common means of transport between the scattered forts of the Hudson's Bay Company. The old unswerving Indian trails are much used as roads; but when dry and free from ruts, the beaten prairie makes a very good road, the chief obstacle being the numerous holes and burrows made by gophers, which often render travelling awkward for horses; the buckboard, however, is very light, and its four large wheels specially adapt it to prairie travelling.

During the long winter the soil becomes frozen to a depth of six or seven feet, and as the upper layers thaw first and allow seeding to be effected, the progressive thawing of the lower layers, as the summer heat increases, provides an ascending current of moisture, which, meeting with the heat from above, constitutes a kind of natural hot-bed, and this phenomenon no doubt partly accounts for the very rapid rate at which vegetation proceeds during the brief period of growth.

At the present time the three most prominent and instructive features in the agriculture of the North-West are probably the Bell Farm, the Experimental Farms of the Canadian Pacific Railway, and the Cattle Ranches of Alberta, and I proceed to give some account of these in the order named.

The Bell Farm.—There is perhaps no enterprise in the North-West better known in England, at least by name, than the Bell Farm, which is so called after its manager, Major W. R. Bell. It is situated at Indian Head, in Assiniboia, 312 miles west of Winnipeg, on the Canadian Pacific Railway, and is included in the operations of the Qu'Appelle Valley Farming Company, Limited, whose capital comprises 120,000*l.* in shares of 20*l.* each, of which 45 per cent. is paid up. The entire farm occupies an area of 54,000 acres, and it was organised in 1882, so

that the first harvest gathered upon it was in 1883, and the second, which I was fortunate to see in progress, was in 1884. In the President's Report, presented to the annual meeting held on January 9th, 1884, at Winnipeg, it is stated that operations were begun during the summer and fall of 1882, when ground was broken to the extent of about 2700 acres, and as it was impossible to further prepare the land by back-setting, it was decided to sow on the "breaking," or once-turned sod. The experiment, for such it was, inasmuch as it had hitherto been the custom to backset before sowing, proved successful, and served to demonstrate that a crop might be raised after merely breaking the sod. Wheat gave an average yield of nearly 20 bushels of choice hard grain per acre, some of which was sold at 3s. 8d. per bushel, delivered on the cars at the farm station, Indian Head. Oats gave a light yield, attributed to severe drought in the early summer. Between 3000 and 4000 bushels were sold at from 3s. to 3s. 2d., but the bulk of this grain, 20,000 bushels, was kept for seed and feed. Ploughing of fresh prairie land was commenced as soon as the frost was sufficiently out of the ground, and was continued with all available force until November 7th, 1883, when active operations were suspended owing to the approach of winter. The ploughs were set to work on the stubbles as soon as the harvest was got in, and by the close of the open season of 1883 there were in all 7000 acres ready for the "spring tooth" and "disc" harrows that precede seeding.

The annual report for 1883 further states that during the year building was carried on continuously. Near the main building, erected in 1882, there was built a granary of 30,000 bushels capacity, with "lean-to" additions for the storage of implements, two barrack cottages for the accommodation of the men at the main station, a blacksmith's shop, and a horse-infirmiry, with several necessary sheds, while twenty-two additional cottages with stables were erected on the surrounding sections. Metal roofing is chiefly employed. The cottages are substantially built, of a uniform size, 26 feet by 30 feet; each contains five rooms, and most of these residences are occupied by married tenants. Each cottage, with stable attached, cost about 160l. A stationary farm granary, of 4000 bushels capacity, and fourteen portable granaries, circular in form, and capable of holding 1000 bushels each, were added to the storage facilities; and the Canadian Pacific Railway authorities had given their assent to the erection of an elevator *

* This elevator is now completed, and has a capacity of 50,000 bushels. Great progress was made in 1884 in the building of elevators, the Canadian

at Indian Head Station, at a cost estimated at 3000*l*. Three miles of fencing were built, and six miles of the chief highways had been planted with trees. The "Beautiful" lake at the south of the farm had been let down the channel of one of the three coulees, by which the farm is drained, so that by an appropriate arrangement of dams, the supply of water is now inexhaustible: the railway company agreed to share the expense of this work. Spring water of excellent quality had been struck at the main house and other stations about the farm.

The financial figures embodied in the report for 1883 are presented in rather a complicated fashion, but as they cannot fail to interest English agriculturists, I reproduce them here with as little variation as possible, merely remarking that in rendering Canadian money into its English equivalent, I have, in this case, taken the dollar at its more exact equivalent of 4*s*. 1½*d*. sterling, most of the other values in the course of this paper being arrived at by assuming five dollars equal to one pound sterling. The gross expenditure for 1883 was 35,546*l*. 11*s*., and the total expenditure since the organisation of the company, 50,453*l*.

Gross Distribution for the year ending November 30, 1883.

	£	s.	d.
Farm Fund, Capital (see below, A.) ..	22,836	17	0
Town Site	1,409	11	4
Farm balance, 1882	1,275	15	0
Listing Stock	10	7	0
Bills Receivable	73	12	0
Stock	368	19	3
W. R. Bell, Manager	85	2	0
Head Office	196	16	0
Farm Fund, Current (see below, B.) ..	6,721	18	9
Expense Account	118	7	0
Interest Account	416	7	8
Directors' Fees	47	9	0
Bills Payable	544	14	0
By-law	8	14	8
H. J. Eberts, Treasurer and Secretary ..	2	8	6
Salaries	1,429	11	10
	£35,546	11	0

This total will not, by the way, be found equivalent to the

Pacific Railway having erected one at Fort William, Lake Superior, to hold 320,000 bushels, and another at Port Arthur, with a capacity of one million bushels. The Ogilvie Milling Company built four, namely, Manitou, 40,000 bushels; Morden, 55,000; Morris, 55,000; Moosomin, 45,000. Others, erected last year, were at Emerson, 27,000; Gretna, 26,000; Morris, 20,000; Manitou, 30,000; Carberry, 40,000; Grieswold, 30,000; and at Virden, 20,000 bushels.

corresponding one in the published accounts, inasmuch as I find what appears to be an error of 10,000 dollars in the latter.

The outlay on the farm,—				£	s.	d.
A. From Capital Account	..	..	..	22,836	17	0
B. From Current Account	..	..	..	6,721	18	9
Contingent	..	..	..	7	17	6
				£29,566	13	3

is thus made up:—

A. From Capital Account—				£	s.	d.
Balance on Ploughing in 1882	..	..	..	214	10	0
Buildings	..	..	..	7,600	7	8
Implements	..	..	..	2,833	1	0
Horses	..	..	..	3,118	17	5
Payments, Real Estate Account	..	..	..	6,314	10	0
Harness	..	..	..	301	11	7
Wagons and Sleighs	..	..	..	355	4	10
Cows	..	..	..	312	0	0
Furniture	..	..	..	56	16	6
Wells	..	..	..	308	8	5
Coulées	..	..	..	133	6	4
Fencing	..	..	..	55	4	4
Hogs	..	..	..	13	0	0
Labour on Improvements	..	..	..	1,205	15	5
Survey Balance	..	..	..	14	3	6
				£22,836	17	0

B. From Current Account—				£	s.	d.
Office	..	..	..	14	13	0
Maintenance	..	..	..	1,018	16	10
Interest and Exchange	..	..	..	18	12	0
Travelling Expenses, Telegrams, &c.	..	..	..	401	6	0
Stable Feed	..	..	..	1,491	19	4
Seed Wheat	..	..	..	874	9	0
Seed Oats	..	..	..	742	10	8
Salaries—Superintendent	..	219	8 2			
Book-keeper	..	45	9 4			
				264	17	6
Insurance	..	..	..	56	15	0
Printing	..	..	..	14	5	6
Coulées	..	164	15 0			
Less (borne by C.P.R.)	..	133	6 4			
				31	8	8
Seeds	..	..	..	10	12	6
Blacksmith	..	..	..	16	19	3
General Work	..	..	..	108	14	10
Labour, Current	..	..	..	1,612	14	2
Teaming	..	..	..	3	1	0
Wood	..	..	..	27	13	0
Ice	..	..	..	12	10	6
				£6,721	18	9

I have had to take a few liberties with the balance-sheet, not, however, affecting its correctness, but simply to present it in a form, shown on the opposite page, in which it will perhaps be more easily understood.

My visit to the Bell Farm was made on September 14th, 1884. Major Bell, who was exceedingly kind, gave Sir Richard Temple, Professor Sheldon, and myself seats in his waggonette, and obligingly answered the many questions we showered upon him during our tour of inspection. The following statements are derived from the notes I then took. In 1884, there were 7000 acres in wheat, and in 1885 it is proposed to have 14,000 acres under this crop. The harvest is usually over by the middle of August, but the summer of 1884 having been an abnormally cold backward season, the in-gathering of the crop was in full-swing at the time of our visit, so that we had an opportunity of seeing 35 self-binding reaping-machines at work side by side. The sheaves are left in stook for a day or two, and then carried to the threshing machines, the grain from which is shot into large wooden granaries in the fields. During winter, when work in general is slack, the granaries are emptied and the wheat is conveyed in sleighs across the snow to the elevators adjoining the railway, whence it is transferred to the freight waggons as required. The standing corn presented a good, regular, and clean appearance. The variety of wheat grown is that known as Red Fyfe, or No. 1 Hard; and it rubbed out into a dry, bright, even sample. No "docking" or weeding of any kind has yet been resorted to, and though, in the case of one field, the prairie rose seemed to have acquired undisputed possession at the beginning of June, the wheat eventually overpowered it, and ultimately gave a good yield. Of poppy there was no trace whatever, and I only saw one solitary plant of corn-cockle, and that, too, in a field of wheat measuring seven miles from corner to corner; most of the fields, however, are two miles long, by one mile wide. The straw was of fair length and beautifully clean, being free from even the faintest trace of rust; at present it is burnt as it comes from the threshing-machine, being used as fuel for the engine, and the ashes are returned to the soil. The steam machinery comprises seven threshing-machines with complete outfit. There are no less than 100 sulky or gang ploughs, and a large number of seeders.

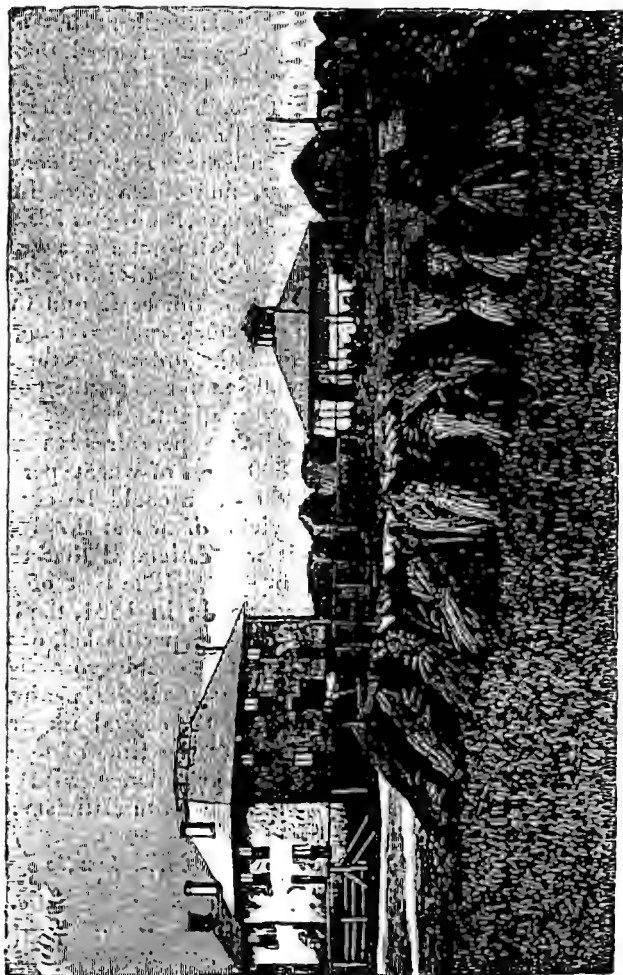
The soil of the Bell Farm is a rich, deep, black loam, with a clay sub-soil. A three-horse team and a sulky plough, working on a 16-inch furrow, and set to a depth of three inches, can turn up two acres a day, at a cost of 8s. per acre. On an adjoining farm belonging to Colonel Sykes, and where steam-ploughing

Balance Sheet, Bell Farm, November 30, 1883.

LIABILITIES.		ASSETS.	
	£ s. d.		£ s. d.
Capital—promoters paid up	20,625 0 0	Due from Can. Pac. Rail. for moiety town site	704 15 8
" subscribed and paid	44,550 0 0	Ditto " Coulee improvement	67 5 6
Bills payable	9,229 13 0	Accounts due, head office	128 15 0
Unpaid accounts	1,398 6 2	Cash in hand	118 16 0
Can. Pac. Rail. account, real estate	2,494 16 0	Valuation—	
Government	4,973 14 0	Moiety town site	6,187 15 0
Hudson's Bay Co.	1,782 10 0	Hotel	3,093 15 0
Accounts due at farm	453 15 0	Town lots	309 7 6
Credit of Profit and Loss	45,677 8 3	Bell Farm, 20,000 acres at \$1s. 3d.	41,250 0 0
		33,720 acres at 24s. 9d.	41,728 10 0
		Breaking 7000 acres and preparing for crop, at 15s. 6d.	5,775 0 0
		Buildings and improvements	11,343 10 0
		Stock and implements, after deducting 20 per cent. for wear and tear	9,167 16 0
		Grain on hand	4,743 3 6
		Accounts due	521 13 3
	£125,135 2 5		£125,135 2 5

Fig. 4.—*Ploughing Bell Farm, Indian Head.*

was resorted to, the cost was 2l. 6s. per acre. Ploughing necessarily ceases with the beginning of winter, but the pulverising effect of the long frosts in the promotion of a desirable tilth and the formation of a good seed-bed, is a factor of considerable importance in prairie farming. The wheat is sown at the rate of $1\frac{1}{2}$ bushels per acre by means of broad-cast sowing-machines, each drawn by one horse. The sowing takes place about the end of March on the rough fallow, the sowing-machines being followed by spring harrows, each drawn by two horses. The

Fig. 5.—*The Bell Farm, Indian Head.*

economy of the farm provides for a summer fallow once every three years, so that one-third of the acreage under cultivation would be left in bare fallow every summer, thus affording opportunity for keeping the land clean, while the aggregate yield of wheat will probably not be less than might be obtained by continuous cropping.

At the time of my visit about 200 horses were being maintained, and all that were not engaged in the harvest-work were employed in ploughing. The cost of a good carthorse, weighing 1400 lbs., ranges from 37*l.* to 40*l.* In summer 135 men are

employed, and in winter about half this number; but of course as the acreage under crop is year by year enlarged, the number of labourers must correspondingly increase. The hours of work are from 7 A.M. to 6 P.M., with one hour out. The summer labourers' wages are at the rate of 30s. a week, and all found; while the permanent labourers get a cottage and one acre of land free with 36s. a week in summer, and 30s. a week in winter. There are five foremen,—a first foreman, who gets 52s. a week, and all found, and four head foremen who get 40s. a week each, and all found. The farm is worked in five divisions, known as the central, and the north, the south, the east, and the west, respectively. At half-past eight o'clock each evening Major Bell telephones from his residence the orders for the ensuing day, and, as these are heard by all the foremen, the possibility of confusion or misconception is very slight.

With the 35 Deering's self-binding reapers already mentioned, it was found practicable to cut 800 acres of wheat per day, so that, at this rate, the entire 7000 acres could be cut in nine working days. The average yield of wheat in 1883 was 20 bushels per acre; for 1884, it was estimated that the yield would reach an average of 25 bushels. The cost of growing wheat in 1883 was 1s. 6½d. per bushel; in 1884, the cost was estimated to be not more than 1s. 5½d. per bushel, or 11s. 6d. per qr. Major Bell said he believed he could grow wheat and place it on the wharves at Liverpool at about 23s. per qr. This price included 8 per cent. interest on the capital involved, and anything above this figure, realised at the time of sale, would represent profit. This result is in accordance with the following statement, which is, of course, open to criticism:—

Estimated Cost of growing a Bushel (60 lb.) of Wheat on the Bell Farm.

	s.	d.
Horses	0	2½
Labour	0	3½
Maintenance of Labourers	0	1½
Sundries, including Seed, Implements, Depreciation, and 8 per cent. interest on Capital	0	9½
	1	5½

This is equivalent to 11s. 6d. per qr. of 480 lbs., and includes the cost of delivery upon the cars at Indian Head Railway Station, from whence to Liverpool is a distance of about 5000 miles. The freight-rate from Indian Head to Liverpool is at present 11s. per qr., thus bringing up the value of the wheat at Liverpool to 22s. 6d. per qr., this price including, as already stated, 8 per cent. interest on capital.

There were 500 acres of oats ready for cutting; they would yield from 50 to 60 bushels per acre, and are largely used for feeding the horses. A 400-acre field of flax was nearly ripe; it was being grown for its seed, which would sell for 3s. per bushel, and the land would go into wheat. Last summer 1400 tons of prairie-hay were gathered in; the natural herbage of the prairie is cut by mowing-machines, allowed to remain exposed for about six hours, then horse-raked, laden on waggons, and stacked, the hay-stacks being conveniently "roofed" up but not thatched, the cost of the latter process being at present too great. About sixty cows and a few pigs are kept.

A good example is being set on the Bell Farm in the planting of trees; some were planted in 1883, as has already been stated, and last spring 25 miles of young poplar trees were set out. They cost 5d. each, and were planted 20 feet apart, the cost per single row per mile being therefore 5l. 10s.

It is proposed when the whole area of the Bell Farm has been brought under cultivation to divide it into 300 farms, each with dwelling-house, stabling, and shedding. The farms, with their equipment, will be fairly valued, and then offered to the men who have taken part in the improvements, at the valuation price, with liberty to render payment in five or ten annual instalments.

Moreover, outside the 20,000 acres which constitute the Bell Farm proper, the Qu'Appelle Valley Farming Company offer their lands for sale in sections varying from 213 to 2560 acres in fee-simple, without conditions, at from 1l. 12s. to 3l. per acre, payable as may be agreed. The Company undertake to break and have ready for seeding the following spring, free of charge, 25 per cent. of the acreage purchased, and they offer various other privileges. The estimates are best reproduced as officially stated, the exchange in this case being at the rate of 5 dollars to the pound sterling.

"In order to give some idea of the cost, the following estimates have been carefully prepared, and may be taken as a guide. They are framed on the supposition that all labour is hired, and that the purchaser contributes comparatively nothing to the result beyond supervision. The question of stock is not gone into, though the addition of cattle, sheep, and pigs would most materially add to the profits, and indeed are a necessity to a thoroughly well-appointed farm.

"For a farm of 213 acres—one-third of a square mile section—the size best adapted for the team of three horses and one plough, on the supposition that the purchaser starts work in April with 25 per cent. ready for crop, and without importing into the consideration the original cost of the land, nor interest on capital:—

FIRST YEAR.

	£	s.	d.
Cost of cottage and stable erected the previous year	300	0	0
Sinking wells (2)	10	0	0
3 Horses and harness	120	0	0
1 Cow	14	0	0
1 Hand plough	5	0	0
1 Harrow	7	0	0
1 Waggon	16	0	0
1 Seeder (capacity 25 acres per day)	10	0	0
1 Self-binder (capacity of 200 acres)	50	0	0
1 Buckboard or single waggon	10	0	0
1 Sleigh	7	0	0
Garden implements, &c.	2	0	0
Miscellaneous tools	2	0	0
Contingencies	20	0	0
Furniture, not detailed, but say	60	0	0

Total on Capital account £633 0 0

	£	s.	d.
Paid labour, 1 man, 1 year	60	0	0
" 1 maidservant	24	0	0
60 Bushels seed wheat for 40 acres	15	0	0
25 Bushels oats for 10 acres	2	0	0
Garden seeds	1	0	0
Seed potatoes, 1 acre	2	8	0
Maintenance of Family (5) and servants	120	0	0
Repairs	6	0	0
One extra hand in harvest, 2 months	12	0	0
Threshing 1500 bushels at 2½d.	15	0	0
Oats and hay for feed before harvest	30	0	0
Twine for binding	3	0	0

Total on Current account 290 8 0

Total Expenditure £923 8 0

"In the mean time the ploughman will have broken during the season 100 acres new land and stubble, and ploughed 50 acres, so there are ready 150 acres for second year.

"The crop from first year will be:—

	£	s.	d.
1000 bushels wheat at (say) 3s. 4d. (about)	160	0	0
500 bushels oats	40	0	0
250 bushels potatoes and roots	20	0	0
	£220	0	0

SECOND YEAR—EXPENDITURE.

	£	s.	d.
Labour—man and girl	84	0	0
Extra labour, harvest and threshing	36	0	0
200 bushels wheat for seed	32	0	0
Seed, oats and feed	36	0	0
Hay	15	0	0
Maintenance	100	0	0
One sulky plough	15	0	0
Repairs and contingencies	30	0	0
Twine	7	0	0
Threshing	40	0	0
	£395	0	0

SECOND YEAR—RETURNS.

	£	s.	d.
140 acres wheat, 3500 bushels	560	0	0
10 acres oats, 500 bushels	40	0	0
Roots	20	0	0
	£620	0	0

"In the third year, and each year thereafter, the system of summer fallow is adopted, and the land cropped is 140 acres, leaving a different one-third thereof at rest each year. The crop will consist of 110 acres of wheat and 20 of grain and roots for feed; and the expenditure is about the same as that of the second year, saving that the cost of hay is dropped out, it being needless to carry it forward year by year.

"This will give expenditure	£365
And crop returns—wheat, other grain, and roots, as	568

Or a net profit of £203

"The estimates for a 500-acre farm may be approximately arrived at by multiplying the capital account of the 213-acre farm by 2, the current account by 2½, and the income by 3, producing the following results:—

"Capital account	£1266	£	s.
Current account	987	10	
Income	1504	0	
Net profit	£516	10	

Or a net profit of 23 per cent. on the whole expenditure.

"For a farm of 1000 acres, by adding one-third to the capital account of a 500-acre farm, one-half to the current account, and two-thirds to income, as follows:

"Capital account	£1688	£	s.
Current account	1481	5	
Income	2506	8	
	£1025	3	

Or a net profit of 32 per cent.

"Cost of stock: working oxen, 35*l.* per yoke; milch cows, 12*l.* to 14*l.* for good grade; young pigs, 16*s.* to 2*l.* each; sheep, 1*l.* 4*s.* to 2*l.* each."

In criticising the foregoing statement, it is impossible to ignore the price of wheat, which is estimated to be worth close upon 27s. per quarter, free on rail, at Indian Head. This estimate seems to me too high, and certainly unreliable for a term of years. Adding 11s. per quarter for freight to Liverpool, the price at that port would require to be 38s. ex ship, a figure quite unobtainable during the past winter. Still, if a price at all approaching 27s. per quarter can be obtained at Indian Head, and wheat can at the same time be raised for less than 12s. per quarter, there is ample margin for profit.

The Bell Farm affords an example of farming reduced as nearly as possible to the factory system. The division of labour is necessarily carried to an extreme, and the management of so huge an undertaking involves an almost military discipline among the workers, and the proprietors are fortunate in having so experienced and capable a manager as Major Bell. It is an interesting phase of prairie farming, but it is farming with much of the poetry taken out of it.

The Alkali Lands.—Before describing the Experimental Farms of the Canadian Pacific Railway it seems desirable to place before the reader some account of the alkali lands of the North American plateaux, and though I have not been able to find a record of a thorough examination of any of those within the Canadian territory, yet as they are presumably much the same in character wherever they occur on the prairies, the following description of the alkali lands met with in the superficial deposits of Nebraska, written by Dr. S. Aughey, will convey a very fair idea respecting them:—

“Where they have been closely examined they are found to vary a great deal in chemical constituents. Generally, however, the alkali is largely composed of soda compounds, with an occasional excess of lime and magnesia, or potash. The following analyses of these soils show how variable they are. The first is taken from the Platte bottom, south of North Platte; the second from near Old Fort Kearney, and the third two miles west of Lincoln:—

Insoluble (silicious) matter	74·00	73·10	73·90
Peroxide of iron	3·80	3·73	3·69
Alumina	2·08	2·29	2·10
Carbonate of lime	6·01	4·29	3·90
Phosphate of lime	1·70	1·40	1·49
Carbonate of magnesia	1·89	1·29	1·47
Potash	1·68	1·80	3·69
Carbonate and bi-carbonate of soda	5·17	7·33	4·91
Sulphate of soda	0·70	0·89	0·89
Moisture	0·99	0·98	0·98
Organic matter	1·20	2·10	2·10
Loss in analysis	0·78	0·80	0·88
	100·00	100·00	100·00

"The specimens for analysis were not taken from soils crusted over with alkaline matter, but from spots where the ground was covered with a sparse vegetation.

"Many of the alkali lands seem to have originated from an accumulation of water in low places, where there is an excess of alumina in the soil or sub-soil. The escape of the water by evaporation left the saline matter behind, and, in the case of salt (sodium chloride), which all waters are known to contain in at least minute quantities, the chlorine, by chemical reactions, separated from the sodium, which latter, uniting immediately with oxygen and carbonic acid, formed the soda compounds.

"These alkali spots are often successfully cultivated. The first steps towards their renovation must be drainage and deep cultivation. The next step is the consumption of the excess of alkali, which can be effected by crops of the cereal grains in wet seasons. In such seasons these alkali lands, if deeply cultivated, often produce splendid crops of grain. Wheat is especially a great consumer of the alkalies; and these being partly removed in this way, and the remaining excess mingled with the deeply-cultivated soil, renders it, in many instances, in a few years capable of being used for the other ordinary crops of Nebraska. Treated in this way, these alkali lands often become the most valuable portions of the farm. There are comparatively few alkali lands in the State that cannot be reclaimed in this way."*

Though in the foregoing analyses the percentages of phosphate of lime and of potash are high, the most remarkable feature is the extraordinary amount of carbonate of soda they show these lands to possess, which is more than sufficient to fully account for their alkaline character.

Canadian Pacific Railway Experimental Farms.—In consequence of rumours and reports to the effect that much of the country along the line of the Canadian Pacific Railway in its course across the third prairie steppe, which extends from Moose Jaw to Calgary, a distance of more than 400 miles, was largely made up of desert and alkali lands, and was consequently quite unfit for cultivation, the railway authorities determined to resort to the plucky expedient of establishing a number of experimental farms at various points on their line west of Moose Jaw, where they would be easy of access and examination by all travellers along the railway. Accordingly, on October 12th, 1883, a special train, consisting of fourteen cars and a locomotive, left Winnipeg for the west, carrying teams, men, and the equipment necessary for the establishment of the farms. So late in the season there was but little time in which to perform the necessary operations. As soon as the locality of a farm had been selected, the thirty teams were unloaded in the morning, and put to work under the direction of one of the Company's field inspectors, and continued to break the prairie-sod throughout the day. The Company's Land Commissioner, after seeing

* "United States Geological and Geographical Survey of Colorado and Adjacent Territory," 1874. By F. V. Hayden, U.S. Geologist. Washington: Government Printing Office, 1876, p. 260.

the day's work fairly started, took the locomotive and his car, and went on in advance until he found a suitable place for the site of the next farm, when he would return and get the men, teams, and outfit together, and transport them during the night to the next field of operations. In all, ten experimental stations were established; the breaking throughout was found to be easy, and the soil in every case good. It was proposed to cultivate the ground thoroughly, in accordance with the most approved methods of breaking and backsetting, so as to have a seed-bed ready by the spring of 1885; those in charge of the work were, however, led to believe that a good crop might be obtained, even off the sod, and it was resolved to make the attempt. Accordingly, on March 27th, 1884, another novel train left Winnipeg, taking boarding cars, men, teams, implements, and seed-grain to commence the spring sowings. At Winnipeg there was still much snow on the ground; but on going westward the weather became milder and the snow disappeared, so that when Dunmore was reached, on the 29th, the snow was entirely gone, while the ground was dry and already thawed to a depth of several inches. The train arrived at Gleichen, the most westerly of the farms, on the 30th, and ploughing and seeding commenced on March 31st. Bearing in mind that the sod was not broken till October, and that the soil had since then been continuously frozen, it is evident that the sod had no opportunity to rot, and the land, when spring seeding began, was practically in the same condition as when left in the fall, so that a proper seed-bed could not be prepared, consequently much of the seed remained on the surface to be withered by the sun or eaten by birds and gophers. To save space, I have condensed the particulars relating to the several farms into the Table on the opposite page, the yields given in which were ascertained by accurately chaining the ground and weighing the produce, this work having been entrusted to a qualified Dominion Land Surveyor.

I have given the yields in the nearest whole number, and the average yield from all the farms was, in bushels per acre: of wheat, $21\frac{1}{2}$; of oats, $44\frac{1}{4}$; of barley, $23\frac{1}{4}$; and of peas, $12\frac{1}{2}$. The weights per bushel varied at the different farms, in the case of wheat from 59 to 63 lbs.; oats, $36\frac{1}{2}$ to $43\frac{1}{4}$ lbs.; barley, 48 to 52 lbs.; and peas, in the only instance in which they were weighed, scaled 64 lbs.

With two exceptions, the harvest was completed before the end of August, while in no case was sowing commenced before the end of March. The short time the crops occupied the ground is worthy of note, particularly in the case of Dunmore, where sowing took place on the 4th and 5th of April, and

CANADIAN PACIFIC RAILWAY EXPERIMENTAL FARMS.

	Miles West of Winnipeg.	Feet above Sea Level.	Acres.	Soil (and its Depth in Inches).	Subsoil.	Yield in Bushels per Acre.			
						Wheat.	Oats.	Barley.	Peas.
1. Secretan	443	2284	11½	Clay loam (5 to 10)	Sandy clay	22	44	17	10
2. Rush Lake	489	2310	13	Sandy loam (5 to 8)	Sandy clay	22	54	18	11
3. Swift Current ..	510	2430	20	Clay loam to sandy loam (10 to 15)	Clay and sandy clay	13	30	(None sown.)	10
4. Gull Lake	546	2569	30	Sandy loam (8 to 18)	Sand and sandy clay	24	56	30	16
5. Maple Creek	597	2500	18	Sandy loam (6 to 12)	Sandy clay	23	49	31	15
6. Forbes	615	2437	28	Light sandy loam (5 to 12) ..	Sand and sandy clay	31	50	28	16
7. Dunmore	651	2406	35	Sandy loam (4 to 8)	Sandy	20	39	32	10
8. Stair	668	2489	18	Clay loam (6 to 10)	Clay	19	25	15	12
9. Tilley	713	2470	..	Sandy loam (6 to 8)	Clay	12	39	14	10
10. Gleichen	785	2061	42	Rich dark loam (8 to 14) ..	Clay and sandy clay	28	56	(None sown.)	13

barley was harvested on July 23rd; oats on August 6th; and wheat on August 7th. Barley thus occupied three months eighteen days for its growth; oats, four months one day; and wheat, four months two days. In some cases good vegetables were grown; and at Gleichen, in particular, I had an opportunity of inspecting some really excellent garden produce. The farm at Secretan, which gave an average yield in wheat and oats, is interesting, because it is situated at the summit of the Grand Coteau of the Missouri, a description of which is given in an earlier part of this paper.

At each farm an acre of land was set apart to determine the results of autumn sowing, spring-wheat and oats being sown and harrowed in at the time of breaking the sod in October. Much of it germinated in November and December and showed green above ground, but it was subsequently killed by frost during the winter. A few patches of wheat which managed to survive the winter, ripened very irregularly and much later than the spring-sown grain. Fall-sowing of spring-wheat, which has proved successful in Manitoba, is therefore not likely to be a success in the western country, where the winter is more mild and open and the grain liable to germinate and perish. Fall-wheat has not yet been tried on the western prairies.

The results obtained from these experimental farms cannot be regarded as other than satisfactory, especially when the rough methods of cultivation, which perforce had to be adopted, are taken into consideration. The matter was, of course, of very considerable importance to the Canadian Pacific Railway authorities, who base the following conclusions on the results arrived at:—1. That, for grain-growing, the land of the third prairie-steppe is capable of giving as large a yield as the heavier lands of Manitoba. 2. That a fair yield can be obtained the first year of settlement on breaking. 3. That from fall seeding with spring grain on the western plains a satisfactory result cannot be looked for. 4. That cereals, roots, and garden produce can be successfully raised at elevations of from 2000 feet to 3000 feet above the sea-level. 5. That seeding can be done sufficiently early to allow of all the crop being harvested before September 1st. With regard to this last point it might be thought that the summer of 1884 was abnormally early on the prairie, but I know that the contrary was the case; it had been an unusually wet backward summer—just the reverse of what we experienced in England—and, at the Bell Farm, 180 miles east of Secretan, the most easterly of the experimental farms, harvesting was, as I have already stated, in full operation on the 14th of September, a much later date than usual.

I may add that samples of wheat from the experimental

farms were submitted for the official inspection of the examiners of the Winnipeg Board of Trade, with the result that the wheat from four of the farms came within the No. 1 Hard Grade, which necessitates its being of the Red Fyfe variety, containing not more than 10 per cent. admixture of softer varieties, and being sound, well cleaned, and weighing not less than 60 lbs. to the measured imperial bushel. The wheat from Dunmore was of special merit, and was graded "extra."

Cattle Ranches of Alberta.—Though cattle are to be found in some numbers in the rich pastures around Turtle Mountain, Moose Mountain, the Wood Mountains, the Cypress Hills, and in the valley of the South Saskatchewan, it is in the Bow River district, south of Calgary, that the best grazing lands occur. The rolling lands, the coulées, the foot hills of the Rockies flanking the lofty summits that loom grandly against the western sky, afford plenty of ground shelter to cattle in this well-watered region; and the warm Chinook winds from the Pacific coast on the south-west rush through the Kootenay, Crow's Nest, Bow River, and numerous other passes. Luscious herbage, abundant and nutritious, grows in this favoured region, and it is here, in the south of the district of Alberta, that the Canadian ranches are to be seen. Stock-raising on an extensive scale is, however, a much younger industry in Alberta than in many of the Western States of the Union. Up to the spring of 1881, the number of cattle in the Bow River district did not exceed 3000: a year afterwards the number had, by importation of fresh cattle and the establishment of new ranches, risen to 15,000; and the increase has since been, and still is, progressive. The Dominion Government grants leases of sections of these grazing lands at the nominal rent of 1 cent ($\frac{1}{2}$ d.) per acre, and the lessee binds himself, within three years, to place upon the land one head of live cattle for every ten acres of land embraced in the agreement, the term "cattle" implying bulls, oxen, cows, or horses at least one year old. The contract is for twenty-one years, during which period the lessee agrees not to apply any part of the land to other than grazing purposes, nor to graze sheep upon the land without the consent in writing of the Minister of the Interior. Should the Governor in Council at any time during the twenty-one years think it to be in the public interest to open for settlement the lands devoted to ranching, or to terminate the agreement for any reason, the Minister of the Interior may, on giving the lessee two years' notice, cancel the agreement at any time. The leases are limited to the area of 100,000 acres, the full extent of which, however, is generally taken up.

As a general rule, in the western districts, a mild winter and

deep snow are unfavourable, while a severe winter and light snow are favourable, to live-stock; but it is not often that a mild winter with deep snow is experienced near the Rocky Mountains. The Chinook winds are so frequent and the snows so light, that wheels are in use all the year round, sleighs being very little in request. Cattle and horses can graze all through the year, almost anywhere south of lat. 52° , and west of long. 110° , so that this would indicate the northern limit of the ranching districts to be about in the latitude of Calgary, although ranching is not so certain here as it is farther south towards McLeod. Indeed, it is maintained that though in the winter cattle and horses may die through unsuitable food, they will not perish from cold. The snow in the West does not lie to a greater depth than a foot or eighteen inches, and is often less, while near the Rocky Mountains the Chinook winds may, as has been noted above, more than once in a winter, lick up the snow and lay bare the pastures. A good cattle ranch should cover an area of at least from 20,000 acres to 30,000 acres. I am indebted to Mr. J. G. Colmer, Secretary of the Canadian Office, in London, for the following summary (p. 81) of the leading ranches and their equipment, as existing last summer in the district between Calgary and Fort McLeod on the east, and the Rocky Mountains on the west. The numbers would have been largely increased at the fall "round-up," but the actual figures are not obtainable yet.

Ordinarily all that is to be seen at a ranch is the open prairie, with the cattle grazing here and there, and the best time to see the cattle is at the "round-up," which, however, only takes place twice a year—in the spring and in the fall. Although each ranch company leases a certain definite area of land, its limits are not adhered to, because this would involve too great an outlay for fencing. Therefore all the cattle are branded with the marks of their respective owners, and they roam at will over the country. At the half-yearly "round-up" the cattle are all collected, and the various brands separated and counted, the calves being considered as the property of the ranch whose cows they follow. After the "round-up," any cattle not branded are sold, and the proceeds go to the Stockholders' Association to provide the funds with which their work is carried on.

The Cochrane Ranch is one of the best known. It occupies some splendid grass-land, and the cattle at three years old will weigh 1200 to 1300 lbs., and be worth 13*l.* on the ranch. Messrs. Cochrane, however, had an unpleasant experience three years ago. They purchased upwards of 4000 head of cattle from a ranch in Montana, to be delivered on the Cochrane Ranch.

Ranches.	Cattle.	Horses.
North-West Cattle Co. (Sir Hugh Allan, High River)	4,500	420
Emerson and Lynch	1,200	200
Leavens, Mount Head Ranch (Lord Castletown), High River	1,500	610
Oxley Ranch (Willow Creek)	7,000	500
Captain Winder and Co.	1,700	250
Walrond Ranch Co. (North Fork, Old Man's River, Pincher Creek)	8,000	175
Jones and Inderwick (North Fork, Old Man's River, Pincher Creek)	1,450	80
Lee (Crow's Nest Pass, P. C. District)	300	30
Garnet Brothers (South Fork, P. C. District)	250	150
Smith (Pincher Creek)	400	40
Alberta Ranch (Sir F. de Winton; Hon. H. Boyle, Pincher Creek)	900	100
Halifax Ranch (Pincher Creek)	1,200	450
Geddes and Kettle (Pincher Creek)	500	20
Captain Scobie (Pincher Creek)	220	20
Hill Brothers (Pincher Creek)	180	40
Stewart Ranch Co. (Pincher Creek)	2,400	400
Godsall (Pincher Creek)	600	—
Cochrane Ranch Co. (Pincher Creek)	6,000	—
Hill and Paterson (Belly River)	300	50
McFarlane (Old Man's River, Fort McLeod)	600	50
J. G. Baker and Co. (Contractors' Beef Herd)	2,300	300
Gallagher (Fort McLeod)	160	—
Trefoil Ranch Co. (Old Man's River, near Fort McLeod)	300	75
Bryant (Willow Creek)	200	—
Military Colonisation Co., General Strange (Bow River)	300	300
F. Stimson (High River)	1,700	100
Vicinity of Calgary and Morley	1,000	1,200
Total	45,160	5,550

on a specified day in October. But they omitted to settle the time at which the cattle were to commence their journey, and as they happened to start late, they were so over-driven in order to get to their journey's end at the appointed time, that they arrived in a very exhausted condition. Cattle can travel at the rate of ten to fifteen miles a day across the prairie, and thrive on the journey; but much more than this was attempted in the case in point. There was a heavy fall of snow soon after their arrival, and the manager relied on the Chinook wind to remove it and leave the ground dry; but the Chinook wind was contrary, the snow remained, and in a few weeks several thousand cattle perished, the new arrivals being the first to succumb. It is possible that had these weak, enfeebled cattle not been mingled with the others, there would have been little or no mortality amongst the latter. At the time of this disaster, however, the site of Messrs. Cochrane's ranch was in the neighbourhood of Calgary, and cattle on other ranches in Alberta did not suffer.

to anything approaching the same extent. It is but fair to add that the winter was a particularly severe one, and that a much larger percentage of cattle was lost in the Western States than north of the 49th parallel. The Cochrane ranch has since been removed farther south towards the Kootenay Pass, and last winter it was very successful, the mortality not exceeding 1 per cent., against 6 per cent. in Montana, and more still in Colorado. Many of the ranch cattle are of the old Spanish breed, but on the Cochrane ranch thoroughbred bulls—Short-horns, Herefords, and particularly Polled Angus—are being used. These bulls were imported from the Cochrane herds in Lower Canada; a journey of 3000 miles by rail and boat landed them at Fort Benton, on the Missouri, whence they were driven 400 miles to the ranch. On arrival, the Shorthorns were in extremely low condition, the Herefords were not much better, but the Polled Angus were in excellent order, and showed no signs of giving way during the severe winters of 1882 and 1883. One bull is allowed to each hundred cows, and always runs with the herd, though on some ranches the practice is to keep the bulls separate from April to August. Thoroughbred bulls are also in use on the Walrond, Oxley, and other ranches. The demand for beef in the North-West is in excess of the supply. The Government are large buyers for the North-Western Mounted Police, and for the Indians, every one of the latter being allowed 1 lb. of flour and 1 lb. of beef per day; these rations, with a certain area of land in the Indian reserves for each Indian family, being in accordance with the stipulations made with the aborigines when the pale-faced settlers deprived them of their land, and brought about the now almost complete extinction of the buffalo. The settlers, too, are considerable buyers, and there is a prospective market at Chicago, for the Montana ranchmen do a considerable trade with this city, their cattle being driven northwards across the international boundary to Maple Creek on the Canadian Pacific Railway, whence they are conveyed in bond to Chicago, *viâ* Winnipeg; this suggests an outlet for their produce which the ranchmen of Alberta are not likely to ignore. The price of steers last season was from 12*l.* to 14*l.*, and of dry cows from 10*l.* to 12*l.* The natural annual increase on the ranches is estimated at about 65 per cent., from animals two years old and upwards. Among the leading owners of Canadian ranches are the Messrs. Cochrane, Mr. Staveley Hill, Q.C., M.P. (who is interested in the Oxley ranch), General Strange, Sir F. de Winton, Lord Boyle, Lord Castletown, Earl of Lathom, and Sir John Walrond. The life of the "cow-boy," as the rancher is called, is necessarily rough and arduous, and often involves the spending of many hours in the saddle. The

special articles in a cow-boy's outfit are: a California saddle with tapaderos (fittings) complete, a rifle on saddle, a pair of schapps (leather leggings), a pair of Mexican spurs, an overcoat, and a cow-boy hat or soft sombrero. The following extract is from an article on Stock-raising in the North-West, which appeared in the Toronto 'Week' last October:—

"The method of working the cattle-ranches is similar to that in vogue in the Western States and territories. Although each owner has his own lease, by mutual consent 'free-ranging' practically prevails; and it by no means follows that the lessee has all or even the majority of his cattle on his own lease. The cattle, of course all *branded*, roam freely about the country. The large cattle companies employ constantly from six to ten 'cowboys,' with an experienced foreman, and a local manager, besides additional hands during hay-making, 'round-up' &c. A large band of horses is also necessary—say an average of five or six head to each cowboy, besides horses for team work and general purposes. Smaller owners—with herds under 1000 head—naturally manage with much greater economy. Two or three good practical men, with from twenty to thirty horses, can do all the work about the ranch and management of the cattle, with the occasional assistance of an extra hand or two.

"The stockmen of Alberta have formed a powerful association, known as the 'South Western Stock Association,' for the protection and advancement of their interests. This association has the management of the annual 'general round up,' which usually begins in May and lasts for about six weeks. All the stockmen in the country send representatives in proportion to the number of their herd, and each 'cowboy' brings with him from four to six horses. It can be imagined that, with 60 men in camp, and a band of over 300 horses, the scenes that occur are often lively and sometimes exciting. In the autumn, local 'round-ups' in the different stock districts are held for the purpose of branding the summer calves, which by the following spring would probably have left their mothers, becoming 'no man's cattle,' or as they are technically termed, *mavericks*.

"The life of the rancher and cowboy is at times a hard one—but withal, picturesque and somewhat romantic. It is true he almost lives in the saddle, but he rides over a splendid country, and enjoys (if he has the faculty) magnificent scenery. The numerous streams and rivers abound in trout, and prairie-chicken, grouse, ducks, and geese, afford abundance of game for the gun. His life has plenty of exciting variety and some danger. There are few more interesting sights than the cowboys at work on their well-trained, sagacious ponies, 'cutting out' cattle from an immense herd, frightened and bellowing, and only kept from a general stampede by the mere continually riding round them. Again, a herd crossing one of our large rapid rivers is a grand spectacle. One or two old steers, perhaps, wade in up to their knees, and then becoming suspicious, attempt to break back. But the main body of the herd presses on them, driven by a dozen cowboys, yelling and cracking their whips, in a cloud of dust behind and at their sides. The leaders are forced into deep water, and soon have to swim, striking out boldly for the farther shore; the others follow, while the cowboys ride into the current to 'keep them a'go'in'. Last of all come the calves, with the rest of the cowboys riding behind. But by this time the leaders are clustring out on the opposite bank, and the main body is drifting down stream in a confused mass. A couple of men gallop down the bank, plunge into the river, and head them up stream again, and in a few minutes the whole band, calves and all, are crossed in safety."

The provisions made by the Canadian authorities to preserve the live-stock of the Dominion free from disease, cannot fail to enlist the sympathetic attention of English farmers; and as the subject is, for various reasons, of special interest just at present, I proceed to give the substance of the regulations of an Order in Council which appeared in the official 'Canada Gazette' so recently as September 8, 1884. It refers to Manitoba and the North-West:—

Whereas the disease of pleuro-pneumonia prevails among neat cattle in the Western State of Illinois, as well as in other more eastern of the United States, and there is reason to believe that neat cattle for breeding purposes have been sent from the State of Illinois to more Western States and Territories, it is ordered that the importation of neat cattle now permitted from the United States and Territories into the Province of Manitoba and the North-West Territory of Canada be prohibited, except on the following conditions:—

1. At Emerson, in Manitoba, or the points of Fort Walsh and Fort McLeod, in the districts of Alberta and Assiniboia, or such other points as may be hereafter indicated by the Minister of Agriculture.

2. For stock or breeding purposes, neat cattle which have been brought to the Canadian frontier for importation may be allowed to cross, subject to regulations hereafter stated.

3. For transit, from West to East, through Alberta, Assiniboia, and Manitoba via Emerson or Gretna, to the State of Minnesota, neat cattle may be allowed to cross the Canadian frontier at Fort Walsh and Fort McLeod, subject to regulations hereafter stated.

4. At Emerson, such cattle from the East shall not be allowed to cross the Canadian frontier, unless after inspection by a duly-authorized veterinary surgeon, appointed by the Minister of Agriculture, they shall be declared free from contagious disease, and also from well-founded suspicion thereof; and further, such cattle shall be subject to a quarantine of 60 days, or such other period as may appear to the Minister of Agriculture advisable.

5. At Fort McLeod and Fort Walsh, cattle, whether for stock or breeding purposes, or for transit, shall not be allowed to cross the Canadian frontier unless they are declared by the duly authorized veterinary surgeon to be free from contagious disease, and also from well-founded suspicion thereof.

6. The owner must produce a duly attested certificate, stating the State or Territory and particular locality whence the cattle have been brought.

7. The importer of such cattle shall pay a fee: for one arrival, 4s.; for not exceeding five, 2s. each; not exceeding ten, 1s. 3d. each; not exceeding twenty, 10d. each; not exceeding fifty, 6d. each; over fifty, 5d. each.

8. No car which has been loaded with cattle in the United States, and crosses the Canadian frontier, shall be allowed afterwards to carry Canadian cattle.

9. No car or cars carrying such United States cattle in transit from West to East, between the points above named, shall be allowed to be shunted in close proximity to any Canadian cattle.

10. Every such car shall be kept as far apart as possible from cars or trains carrying Canadian cattle or Canadian goods.

11. No such car shall form any part of a train carrying Canadian cattle.

12. Every car or train carrying cattle in transit from West to East between the points before named, shall stop at such fixed places as shall be named by the Minister of Agriculture for the purpose of rest, feeding and

watering; and such places shall be declared 'infected' within the terms of 'The Animal Contagious Diseases Act, 1879,' being strictly isolated, and all communication with them prohibited, except by the officers and men in charge of the trains, or of such infected places.

13. Every car which has been used for carrying animals from the United States or Territories, in transit through the Districts of Alberta and Assiniboia, or the Province of Manitoba, *viâ* Emerson and Gretna, shall be thoroughly cleaned and disinfected before re-entering the Province of Manitoba, in such manner as shall be ordered by the Minister of Agriculture.

The suitability of Southern Alberta to purposes of ranching is now regarded as established. It is stated that the poorest pastures in Alberta surpass the greater part of the area of the State of Montana in stock-raising capabilities, and some of the leading ranchers in Montana are directing their attention to Alberta. It is believed that in a few years Alberta, which is already arranging to supply the Winnipeg market with cattle, will furnish beef and mutton, not only to the eastern provinces of the Dominion, but to the English market as well. In the Calgary district, the cattle are being transferred farther south, and the old ranches are being stocked with sheep and with other cattle more particularly suited to the lands in that section; sheep being at present excluded from the district which lies south of a line drawn from the High River to the Bow River, and thence along the South Saskatchewan. Last summer over 12,000 sheep were driven from Montana into Alberta, one company alone importing a flock of 8000 head; and in the season of 1885 the drive of sheep is expected to far exceed that of last season. The upwards of 6000 horses in Alberta are estimated to be worth 80,000*l.*, and the leading ranches are doing their best to improve the breed, having imported from across the Atlantic a number of first-class sires, including Percherons and Clydesdales. The estimated value of the cattle of Alberta last summer was 375,000*l.* Bovine epidemics are entirely unknown in this region, and though it is customary for the cattle on these ranches to be neither sheltered nor in any other way cared for during the winter, yet the projected North Western Live Stock Company proposes to erect buildings for the housing of cattle during the winter, and to properly furnish, equip, and gradually enclose the lands. But the opinion of most of the ranchmen is that no danger need be apprehended from prolonged falls of snow, even if such should occur, provided there are abundant stocks of hay with which to feed the cattle; indeed, prairie hay is now largely gathered in summer for this purpose.

It is worth noticing that the amount of butter made in Alberta does not nearly supply the local demand, and last summer farmers found a ready sale for all they could make at from 1*s.* 5*d.* to

2s. per lb. This is partly attributed to the high price of dairy cattle; the number of these was, however, largely increased during the season. The manufacture of cheese has not yet commenced in Alberta, but several enterprising farmers intend to embark in this industry next summer. Indeed, with its rich, sweet, and luxuriant grasses, and its innumerable streams of pure cold water, I can see no reason why Alberta should not develop into a first class dairy farming country, nor why Calgary should not become one of the great cities of the Dominion. I must thank Mr. F. Cochrane for considerable information, which he was kind enough to give me when I was at Calgary.

Life on the Prairies of the North-West.—The prairie, whether flat or rolling, is less uninteresting than might be imagined. On the level prairie it is possible to get a conception of the immensity of the blue vault overhead, such as can be obtained nowhere else, not even on the sea, for the contrast between earth and sky is more marked on the prairie than on the ocean. But one duty seems imperative on the prairie farmer, at least it should be—and that is the planting of trees. They can be obtained cheaply enough, and a few put in every year would, even in half a dozen years, immensely improve the appearance of the now treeless plain. They would also act as conservators of moisture, and, besides breaking the force of the wind, would afford grateful shade in the summer and shelter in the winter to both man and beast. Although various species of clematis, buckthorn, maple, black-thorn, bramble, rose-briar, and white-thorn grow in one part or another of the prairie, and might no doubt be combined into hedge rows, yet these latter are undesirable, as they would afford facilities for the accumulation of snow-drifts. Hence, as a lover of the picturesque in agriculture, I advocate the practice of tree culture on the Canadian prairies; every tree that is planted will constitute a potential source of wealth, and ere long it might be said of the North-West prairies as it is of Nebraska: "The bleak naked surface of this prairie State has become diversified with myriad groves which relieve the monotony of the landscape and refresh the eye with the beauties of woodland growth, while they form a barrier against the winds, and are developing into valuable preserves of timber." Indeed, Professor Brown, of the Ontario Agricultural College, looks forward to the time when the North-West will be in a position to constitute, by annual wood-thinnings, a source of revenue, and, with this object in view, he advocates—

"1. The establishment of two or more stations as nurseries throughout the North-West, with houses for labourers and foremen, and enclosures suitable for production of trees, both from seed and by purchase."

- "2. The careful testing of varieties of trees native and foreign to Canada.
- "3. The gradual and systematic choice of positions for plantations, their fencing, and such cultivation preparatory to tree-planting, as may be necessary.
- "4. The immediate recording, by Statute of the Dominion, of power by Government to resume any part of land leased or sold, or to be leased and sold, for purposes of tree-planting.
- "5. The gifts of trees to settlers, upon conditions.
- "6. The annual planting and care of the trees upon the best known principles of science and practice.
- "7. The appointment of a Forest Conservator—directly responsible to Government."

The healthiness of the prairie as a place of abode hardly admits of a doubt. There is certainly the long period of five months of winter to struggle through, but the dwellers on the prairie are a cheerful people; they work through the summer and have time to spare for festivities in the winter. Besides, there is no problematic element about the winter on the prairie as there is in England. The settlers know perfectly well that at some date in November everything will get frozen up, and will remain so till March or April. They expect it, and they are prepared for it. Their clothing is suited to such a winter; their houses are admirably arranged for the utilisation of stove-heat, and the people are quite ready to use melted snow in their tea-kettles. The children, born and bred on the prairie, cannot fail to be hardy and healthy, and this vast territory seems destined to become the cradle of a fine race of men. I saw children it was a pleasure to look at, and one day when a halt was called for half an hour, I was wandering alone across the prairie, when a lovely child, the picture of health and beauty, approached me, and in the frankest, most winsome manner possible, gave me a bunch of the sweet-smelling holy grass, *Hierochloë borealis*. Of course, I thanked the donor—she was quite a little girl—for her graceful welcome to the stranger from the East, and gratefully accepted the gift. I have it now, and mean to keep it, but my recollection of the charming little "prairie flower" by whom it was given to me will remain long after the fragrance of the holy grass has passed away.

Though many of the prairie towns are barely a year old, there is far less roughness, and much more evidence not only of civilised, but of polite life, than might be looked for. This is, no doubt, greatly due to the fact that not a few gently nurtured women have bravely determined to face the hardships of a pioneer life in order that they may soften the struggle for brothers, or fathers, or husbands. And some of the ladies of the North-West are as witty as they are accomplished. Last autumn two or three English ladies somewhat given to severe forms of

study, called on the wife of a well-known prairie farmer, and happened to mention that one of their chief objects in visiting the North-West was to discover all they could about primeval man. "Yes," sweetly rejoined their hostess, "but don't you think it would be far more interesting if you turned your attention to modern man?"

The Marquis of Lorne gives a graphic description of the prairie: *—

"For my part I never tire of the summer aspect of the plains. In the winter they are often desolate-looking enough; and what landscape is not? There is at all events this to be said for the winter prairie, namely, that the sky is seldom only of a dull grey above it, and is oftener than in Europe of a bright blue, filled with the cheerfulness of sunlight.

"There is one drawback in summer, and this is the universal presence of the mosquito; but take a day in autumn, and then see if you do not enjoy the prairie. If you are in the eastern parts, the long grass is nearly up to your hips as you stand in it, and its green blades are varied with purple vetches and tall asters. Your horizon is circumscribed, for poplar clumps, with their white stems trembling in the noonday breeze, are not far off, in whatever direction you look. Out of the netting of the poplar you emerge into a more open world, with hardly a tree. The grasses are not so long, but still the lily or the sunflower is present in masses of blossom. There are marshes thick with tall sedge, and long tawny grass around the margin. There are clear pools and lakelets fringed with reed; and in September what numbers of wild fowl!—swans, difficult to approach, and tall white cranes, and the small sand-crane in flocks. We hear cries in the air above us, and, looking up, we see against a grey cloud great white birds flapping heavily along. They are pelicans, white except the quill-feathers; and behind them now, but rapidly overtaking them, is a long string of other birds, also white, except the wing-feathers. These fly in waving curves, looking in the distance like rows of pearls waved in the air. They are snow-geese, coming, like the pelicans, from the far northern breeding-grounds, and they alight on a lake near at hand, making a long white band on its blue water. They are worth stalking, and an attempt is made, but only one is killed, and the rest take the wing and are no more seen that day. But the ducks are tamer, and come circling back, and afford excellent sport. What a variety! The most common are blue-wing teal, shoveller, dusky duck, and mallard. Certainly there is no easier and better way of having wild-fowl shooting than by a visit to the North-West. Once out of Manitoba the land swells into waves, and from each ridge a marvellous extent of country is seen. The lakes are fewer, and a long march is sometimes necessary before a good camping-ground is found. The herbage, except in such spots, is poorer, and the general effect given by it is a dull grey-green, shading in the middle distance to grey and ochre, and then far away these tints become mixed with delicate pinks and cobalt blue. 'Far away?' Yes, indeed, the distance seems infinite. You gaze, and the intense clearness of the air is such that you think you have never seen so distinctly or so far over such wide horizons before. Plateaux, hollows, ridges and plains lie beneath you, on and on, and there is nothing to keep the eye and mind from the sense of an indefinite vastness. There is no special mark to arrest the gaze, and it wanders and wanders on to those pink and blue shades, where the skies, light and beautiful in tint, are joined in harmony of colour to the endless swell and roll of the uninhabited world beneath them. A wonderful

* 'Canadian Pictures,' p. 178.

sense of freedom, and yet of loveliness, is borne in upon you; and you feel perhaps that you would like to keep the liberty and yield some of the loneliness, and pitch your tent and live, if live in the wilderness you must, away to the north, where the streams chime in swifter currents through the more varied lands, and forest succeeds meadow, and fertile dale and prairie have near them the whispering shelter of the firs, and morning and evening lights above these the flaming colours of rose and of crimson on the snow-fields of the Western Alps.

"We will hurry on to Edmonton, and hear the reports there. Many men from Ontario have got property here, and there is abundance of coal as well as of timber in the vicinity. Horses do well when left out in winter. This is now comparatively well-known ground, but there may be some interest in endeavouring to see what lies beyond the paths which are already more or less beaten tracks. There is no stranger sensation than that of camping night after night in meadows which are full of such good grass that you feel inclined to look round for their owner and to ask his leave. But there have been none from the beginning of time to say you 'nay.' Even the savage has here never molested the pioneer. No one having a taste for exploration, for sport, or for settlement in some far-away but fair region, where he may live as the pioneer of a community on land certain to rise in value, need fear to pursue his object on account of any native's hostility. There is no one to hinder him, if he wishes to break the soil where the great Peace River forces its way through the grand masses of the mountains, or settle near the Hudson's Bay Company's posts farther down along the banks of the deeply-wooded stream. There is a singular charm in thus being amongst the first in a new land, but by-and-by more companionship is desired: and it is not to be doubted that each wave of emigration as it is poured westward will send many a stout fellow onward until he rests satisfied with his farm, from which he may see the giant and serrated ridges and peaks of the Rocky Mountains far away, cut clear and distinct, dark blue, against the western sunset light."

As the traveller by the Canadian Pacific Railway speeds onward across the prairie, he will not fail to notice every now and again, the buffalo skulls which lie bleaching in the sun. Last autumn these were quite familiar objects, but the utilitarian spirit of the age will allow them to rest there no longer. They are being collected and sent in truck-loads eastward, to be worked up at St. Paul or Chicago into artificial fertilisers.

Intoxicating liquors are entirely prohibited from the whole of the North-West, and it is illegal either to make or to possess any of these fluids. This prohibitive law is not in force, however, in Manitoba, and as a train leaves this Province and enters Assiniboia, members of the North-Western Mounted Police may come "aboard" and search the cars for contraband liquor, as indeed they may do anywhere else between Manitoba and British Columbia. The law was made for the sake of the Red Indians, who do not understand the intelligent use of "fire-water," but who will speedily drink themselves into a state of frenzy, provided they get an opportunity to quaff *ad lib.* It is an offence under any circumstances to supply an Indian with alcoholic drink. The "free and happy barley," which flourishes

so well in the North-West, and the magnificent hops which grow wild, cannot there mingle their infusions as they do in many lands where Red Indians are not. However, the prohibitive law is not irrevocable, but it will probably remain in force just so long as the weakness of the Indians for alcoholic liquors may appear to render it expedient. The prohibition is said to have had a very beneficial effect during the time that the large body of workmen engaged in laying the Canadian-Pacific Railway passed through the land. Enthusiastic dwellers on the prairie say that the very air is intoxicating, and though it did not produce this effect on me, I am quite prepared to admit that it is invigorating.

The Settlements.—A brief reference to a few of the settlements in Manitoba and the North-West may prove interesting to readers who have given attention to the subject of emigration. The Selkirk settlement, which has already been mentioned, began with a grant of land near Fort Garry, made by the Hudson's Bay Company to Lord Selkirk in 1811. The following year the first immigrants arrived from Scotland, and landing at York Factory on Hudson's Bay, proceeded southwards to the Red River. Four years later another body of settlers arrived, and one or two of these are still living, notably, Mr. R. McBeth, Kildonan, on whose land wheat has been grown continuously for fifty years, and the yield remains as good as ever. Many of the descendants of these old settlers are now among the wealthiest farmers of Manitoba and the North-West.

The crofters in the Gordon-Cathcart settlement, who went out in 1883, under the scheme of emigration elaborated by Lady Gordon-Cathcart, have, so far, made excellent progress, and were joined by other crofters last year, so that there are now located on the settlement, which extends over about 250 square miles, some 60 families. They have mostly settled on a very moderate expenditure, the means for which were advanced to them on easy terms; but although they appear to have succeeded admirably hitherto, and to be well pleased with their prospects, sufficient time has not elapsed to permit me to speak very definitely. They are located at Wapella, Assiniboia.

The same reservation applies to the East London settlement at Moosomin, in the extreme east of Assiniboia. This was a more hazardous experiment than in the case of the crofters, for most of the settlers from London were quite unacquainted not only with farm-life, but even with country-life, and a more marked contrast than that which exists between the prairie and the East-end of London can hardly be conceived. The settlement at present consists of about 20 families, and from the reports of

several philanthropic gentlemen who visited it last autumn, the progress hitherto made, as well as the outlook, are of an encouraging and gratifying character.

One of the most interesting settlements is that of the Mennonites. They were German-speaking Russian subjects, followers of Simon Menno, who preached that war is a crime, and rather than undergo military service, they—or at least such of them as could get permission from the Russian Government—left their homes and emigrated to Canada, where the Dominion Government, in 1876, made them a grant of 640 square miles of some of the best land in the Red River Valley, in Southern Manitoba. The soil is a good loam, 3 feet deep, and as the settlement has been established eight years, the Mennonite farmers may fairly be expected to have acquired some exact knowledge of the capabilities of the land which they till, and they find it desirable to allow a bare fallow every fourth or fifth year, this being about the only case of fallowing in Manitoba. They have some such “rotation” as,—wheat, wheat, oats, wheat, fallow; the season of fallow being known as the “black year.” Wheat is most largely grown, then oats; barley is only sparingly cultivated. I believe they have not yet tried a cropped fallow, but this would seem desirable, particularly as they fallow the land because they find it has become too weedy and dirty after the fourth successive corn crop. The cultivation is prosecuted on a kind of communal system, there being a huge field of wheat belonging to a number of families, another of oats, and so on. Their cattle are herded in one huge pasture, and the manure from the cow-houses is cut into oblong pieces, dried in the sun, and stacked in the same way as “turf” in Ireland, and, like peat, it is used in winter for fuel. The Mennonites now number some 8000 people, and their settlement comprises a number of villages. Many of their kinsmen in Russia would no doubt like to join them, but the Russian Government has not allowed any of them to emigrate since 1876.

There are also a Jewish settlement, made up of Jews of various nationalities, and an Icelandic settlement.

FUTURE OF PRAIRIE FARMING

Most of the farming in Manitoba and the North-West must be described as pioneer farming. There is very little settled or approved practice, and rotations are almost unknown. But Manitoba has taken a great step in advance in the establishment of her Board of Agriculture, probably the most efficient in the Dominion, and the influence of which is bound to make its mark upon the development of agriculture in the Province.

The dearness of hired labour, and the necessity, especially at harvest-time, of getting through much work in a short period, lead to a great demand for labour-saving appliances, many of which are of American make. Current prices last summer were about as follows:—Breaking plough, 4*l.* 7*s.*; stubble plough, 3*l.* 10*s.*; sulky plough, 13*l.* 10*s.*; sulky gang plough, 20*l.* 11*s.*; set of iron harrows, 3*l.* 10*s.*; broadcast seeder, 12*l.* 16*s.*; horse hay-rake, 7*l.* 10*s.*; twine-binder, 5 feet cut, 48*l.*; ditto, 7 feet cut, 52*l.*; Brantford mower, 16*l.*; reaper, 21*l.*; waggon, 4 wheels, 15*l.* 10*s.*; set of Manitoba bobsleighs, 6*l.* 5*s.* A yoke of oxen would cost about 32*l.*; and a set of ox-harness, 2*l.* 10*s.*; a 12-horse-power threshing-machine, 240*l.* to 280*l.* A smooth wire-fence with wooden uprights, which offers no facilities for snow-drifts, costs, including fixing, from 20*l.* to 30*l.* per mile; two men can fix a mile in four days. At the leading stations along the Canadian Pacific Railway implements and machines are exposed for sale.

Undoubtedly one of the great dangers this new field of agricultural enterprise has to face is that which arises from careless and slovenly cultivation; and of this, even now, plenty of examples may be seen. It may arise either from ignorance on the part of the cultivator, which to some extent is pardonable, or from the conduct of a mere speculator, who, having taken up a section in a locality where he thinks land may, for various reasons, rise in value, gets all he can out of the soil, and then tries to dispose of his holding at a profit. It must, however, be admitted that the very ease with which the prairie soil is brought under cultivation constitutes in itself some sort of temptation. It is so unlike Eastern Canada in this respect,—there is no laborious and protracted labour with the axe to fell timber and make a “clearing,” nor is there a patient waiting for years in order that charred root-stumps may rot and get torn up, and the space they cover become occupied by crops. The pioneer in the Far West can commence his tillage operations at once, and can even take a crop of oats “off the sod” if he pleases. Considerations such as these cannot but afford some cause for anxiety to those who have thought upon the problem of the agricultural development of this vast region of the British possessions; and I may be permitted to reproduce here opinions which I have not hesitated to express elsewhere: *—

“It is much to be hoped that the prairie farmers will not abuse the privilege they have of working a virgin soil of great fertility by indulging in reckless or slovenly farming. No doubt the temptation is great to take out of the soil all that it will yield, and to care little or nothing about its future. But

* ‘The Canadian Gazette,’ January 22, 1885, p. 364.

it should not be forgotten that the fertility of a soil, which may be very greatly reduced by slovenly farming, may be undoubtedly conserved by prudent methods. The wise farmer is he who takes up only a certain amount of land, and farms it well, rather than he who undertakes the management of an area altogether beyond his capital and his proper supervision. Slovenly farming must tend sooner or later to deteriorate the value of the holdings. The prudent settler will no doubt think of the time when he will wish to hand over his property to his sons, or possibly to realise upon it, and thus it is that good and careful farming will be bound to tell. Even in the course of a few years a slovenly farmer with a large holding will find himself in a worse position than a careful farmer with a considerably smaller holding. Hence, the most prudent course to pursue is for the settler to commence with a small area and farm it well, and to gradually extend his holding as he finds he has more means at his disposal."

The great majority of prairie farmers have necessarily gone to the greatest outlay which their capital will warrant; and though the prairie is not without its wealthy farmers, a larger influx of men with fair means would be of great service, for they could show a superior style of farming, and by their example stimulate their brother farmers to achieve better results on their own holdings. As to the direction which prairie farming is likely to take:—

"There can be no doubt that the natural herbage of the prairie (and it must be remembered that on the typical prairie no plants attain higher stature than we ordinarily associate with the idea of herbage) affords at present unlimited capacity for the production of beef and mutton. Hitherto prairie farming seems to have been directed rather to the production of grain. The results that have been attained, it is true, undoubtedly justify the general impression as to the first-class wheat-producing power of the prairie. But, from what I saw, I am led to infer that very much of the prairie land is capable of yielding better results than those which may be derived by the growth of cereals alone. It would be a most desirable thing, every one will admit, for the prairie farmer to be able to render himself to a great extent independent of fluctuations in the price of wheat, and I believe that, if his operations were directed in the proper groove, he should be able to supply himself and his family with all the necessities of life except groceries. Mixed farming, and mixed farming alone, can effect this end. The question which presented itself to my mind, therefore, was whether the prairie soil and its surroundings were adapted to mixed farming, and I have not the least hesitation in answering in the affirmative. To make the prairie a mere wheat-producing area appears to me a mistake. I hold that every prairie farmer, though dependent perhaps in the main on the growth of cereals, should by no means neglect the maintenance of live stock."

The splendid soil of the Red River Valley only occupies the eastern border of the prairie, and though soil of a similar rich character extends along the valleys of the Saskatchewan and the Peace Rivers, the time will come when manuring will be necessary over much of the area of the prairie. The main-

tenance of live-stock, too, will enable the straw of the cereal crops to be put to more economic use than that of fuel.

There is a prevalent idea that, because the farming on the prairie is, much of it, primitive in style, it is immaterial whether an intending settler knows little or much of the practices of modern agriculture. Such a notion is delusive and mischievous, and there can be no doubt that a knowledge, and a good knowledge, of English farming would prove extremely valuable on the prairie. Equipped with such knowledge, the prairie farmer is possessed of an ideal to which he can always be getting nearer and nearer in the management of his holding. But if he commences operations with no agricultural knowledge at all, or only with that which he may have acquired on the prairie itself, he is far less advantageously circumstanced, and must be dependent on external influences for any improvements in his practice; whereas the farmer who has taken with him the effects of a good training, will find his own mind continually suggesting to him desirable modifications based on the recollections of past experience. The marked contrast of the seasons, and the uneven distribution of labour throughout the year, may no doubt be cited as points in which the prairie must ever differ from the old country; but, independently of these, the farming of the prairie must continue, it may be slowly, but none the less surely, to approximate in its character to the best types of English practice,—even as the farming of Ontario is obviously doing to-day. The general maintenance of stock, for example, will go a long way towards affording occupation for the winter months, over and above that which is concerned with the hauling of wood and corn, threshing, fence-making, blacksmith's work, repairing houses and buildings, shooting and fishing, as at present, and may even create for winter labour a demand which does not now exist.

